Kolmakof Mine
Sampling and Quality Assurance Plan
Bethel, Alaska
TDD: 99-05-0002

Contract: 68-W6-0008
February 2000

Region 10

START

Superfund Technical Assessment and Response Team

Submitted To: Monica Tonel, Task Monitor
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SAMPLING AND QUALITY ASSURANCE PLAN FOR:

Kolmakof Mine
Bethel, Alaska

TDD: 99-05-0002

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Contract No: 68-W6-0008

Date: February 19, 2000

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SAMPLING AND QUALITY ASSURANCE PLAN
KOLMAKOF MINE
BETHEL, ALASKA

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SQAP DISTRIBUTION LIST

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LIST OF ACRONYMS

Acronym	Definition
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ANILCA	Alaska National Interest Lands Conservation Act
bgs	below ground surface
BLM	United States Department of the Interior, Bureau of Land Management
cfs	cubic feet per second
CLP	Contract Laboratory Program
COC	chain of custody
DQOs	data quality objectives
E & E	Ecology and Environment, Inc.
ENRI	Environment and Natural Resources Institute, University of Alaska Anchorage
EPA	United States Environmental Protection Agency
FOWP	Field Operations Work Plan
GPS	Global Positioning System
HSP	Health and Safety Plan
IDWs	investigation-derived wastes
TKC	The Kuskokwim Corporation
MVA	mercury vapor analyzer
NPL	National Priorities List
PM	project manager
PPE	probable point of entry
ppm	parts per million
PA/SI	Preliminary Assessment/Site Inspection
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
QMP	Quality Management Plan
RSCC	regional sample control coordinator
SI	Site Inspection
SOPs	Standard Operating Procedures
SQAP	Sampling and Quality Assurance Plan
START	Superfund Technical Assessment and Response Team

LIST OF ACRONYMS (CONTINUED)

Acronym	Definition
TDD	Technical Direction Document
TDL	target distance limit
TM	task monitor
USBC	United States Bureau of Census
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USPHS	United States Public Health Service

SAMPLING AND QUALITY ASSURANCE PLAN
KOLMAKOF MINE
BETHEL, ALASKA

TDD: 99-05-0002

1. PROJECT MANAGEMENT

1.1 PROJECT/TASK ORGANIZATION

This section outlines the individuals directly involved with the Kolmakof Mine Preliminary Assessment/Site Inspection (PA/SI) project and their specific responsibilities. Lines of communication are shown in the Project Organization Chart (Figure 1-1).

1.1.1 United States Environmental Protection Agency (EPA), Region 10, Task Monitor (TM)

The EPA TM for this project is Monica Tonel. The EPA TM is the overall decision maker and coordinator of the project. The TM reviews and approves the site-specific Sampling and Quality Assurance Plan (SQAP) and subsequent revisions in terms of project scope, objectives, and schedules. The TM ensures implementation of the site-specific SQAP. The TM is the primary point of contact for general project problem resolution and has approving authority for the project.

1.1.2 EPA, Region 10, Quality Assurance (QA) Officer

The EPA QA officer for this project is Barry Towns. The EPA QA officer reviews and approves the site-specific SQAP and revisions in terms of QA aspects. The EPA QA officer may conduct assessments of field activities.

1.1.3 EPA, Region 10, Regional Sample Control Coordinator (RSCC)

The RSCC for this project is Melody Walker. The RSCC coordinates sample analyses performed through the EPA Contract Laboratory Program (CLP) and/or the EPA, Region 10, Manchester Environmental Laboratory (Manchester Laboratory) and provides sample identification numbers.

1.1.4 Ecology and Environment, Inc., (E & E) Superfund Technical Assessment and Response Team (START) Project Manager (PM)

The START PM for this project is Daniel Frank. The START PM provides overall coordination of fieldwork; provides oversight during preparation of the site-specific SQAP; implements the final approved version of the site-specific SQAP. The START PM records any deviations from the SQAP

during implementation and serves as the primary point of contact with the EPA TM; receives CLP and EPA Manchester Laboratory information from the RSCC; serves as primary START point of contact for any technical problems; and is responsible for the execution of decisions and courses of action deemed appropriate by the TM. In the absence of the START PM, a START site manager will assume the PM's responsibilities.

1.1.5 E & E START QA Officer

The START QA officer for this project is Mark Woodke. The START QA officer reviews and approves the site-specific SQAP, conducts in-house audits of field operations, and is responsible for auditing and reviewing the field activities and final deliverables, and proposing corrective action for non-conformities, if necessary.

1.1.6 E & E START Program Manager and EPA Project Officer

The START Program Manager, David Byers, and EPA Project Officer, Gary Sink, are responsible for coordinating resources requested by the EPA TM and for the overall execution of the START program.

1.2 PROBLEM DEFINITION/BACKGROUND

Pursuant to EPA START Contract No. 68-W6-0008 and Technical Direction Document (TDD) No. 99-05-0002, E & E will perform a PA/SI at the Kolmakof Mine site, located in the Sleetmute Quadrangle of Alaska, approximately 18 miles east of Aniak, Alaska, and 120 miles northeast of Bethel, Alaska. The PA/SI will consist of limited sampling at potential contaminant source and target areas for site characterization purposes. This document outlines the technical and analytical approaches that E & E will employ during the PA/SI fieldwork.

This document is a combined Field Operations Work Plan (FOWP) and site-specific Quality Assurance Project Plan (QAPjP) for field sampling activities. The combined FOWP/QAPjP, hereafter called *the SQAP*, includes a brief site summary; project objectives; sampling and analytical procedures; and QA requirements that will be used to obtain valid, representative field samples and measurements. The SQAP is intended to be combined with information presented in E & E's Quality Management Plan (QMP) for START, Region 10. Copies of the QMP and the site-specific Health and Safety Plan (HSP; prepared for the Kolmakof Mine PA/SI) are available in E & E's office located at 999 Third Avenue, Suite 1500, Seattle, Washington 98104. Standards contained in the SQAP and QMP will be used to ensure the validity of data generated by E & E for this project.

This section discusses the site background (Section 1.2.1), site operations and source characteristics (Section 1.2.2), and site characterization (Section 1.2.3) for the Kolmakof Mine.

1.2.1 Site Background

Information presented in this section is based on a review of Kolmakof Mine background information and on interviews with property owners and representatives of the United States Department of the Interior, Bureau of Land Management (BLM). Under the Alaska National Interest Lands Conservation Act (ANILCA; Public Law 96-487), the Calista Corporation, and the Kuskokwim Corporation (TKC) have selected lands at the site.

1.2.1.1 Site Location and Description

This section presents the site location, site description, and site ownership history.

1.2.1.1.1 Site Location

Site Name:	Kolmakof Mine
CERCLIS ID No.:	AKSFN1002086
Location:	Kolmakof Mine, Bethel Census Area, Alaska
Latitude:	61°35' 22.825"N
Longitude:	158°55' 22.438"W
Legal Description:	Sections 5 and 6, Township 17N, Ranges 53W, Seward Meridian
Site Owner/Contact:	Ms. Lorri Denton, Realty Specialist BLM 6881 Abbot Loop Road Anchorage, Alaska 99507 (907) 267-1244
ANILCA Native Selections:	Ms. June McAtee, President Calista Corporation 301 Calista Court, Suite A Anchorage, Alaska 99518 (907) 279-5516
	Mr. Jeff Nelson, Land Manager TKC P.O. Box 104460 Anchorage, Alaska 99510 (907) 276-2101

Additional Site Contacts:

Ms. Annie Morgan
Aniak Tribal Administrator
Aniak Traditional Council
P.O. Box 349
Aniak, Alaska 99557
(907) 675-4349

Marcie Sherer, President
Village of Napaimute
P. O. Box 568
Bethel, Alaska 99559
(907) 543-5366

1.2.1.1.2 Site Description

The Kolmakof Mine is on the bluffs along the north bank of the Kuskokwim River, approximately 18 miles upstream from Aniak, Alaska (Figure 1-2). The site covers approximately 1,280 acres and consists of two main areas: the lower camp near the shoreline and the upper camp on the bluff, approximately 2 miles west of the lower camp (Figure 1-3). Five buildings used for housing and equipment storage are present at the lower camp. The upper camp consists of a mine mill, a retort, a caved adit, a caved shaft, and several trenches (USGS 1965). Mine tailings at the upper camp are eroding down the bluff into the Kuskokwim River. Most mine activities took place at the upper camp area in a small, open pit above the Kuskokwim River (Bundtzen et al. 1999). Access to the site is uncontrolled but is possible only by boat or aircraft.

1.2.1.1.3 Site Ownership History

The Kolmakof mercury deposits were identified by Russian settlers in 1838 (USGS 1965). In 1881, the Kolmakof Mine was prospected by Mr. George King and mined commercially by the Alaska Commercial Company agent Reinhold Separe (Bundtzen et al. 1999). In 1901, a prospector, Mr. Duncan McDonnell, found high-grade ore at the site; however, he never established a mine (Bundtzen et al. 1999). In 1908, Mr. Gorden Bettles established a small-scale adit mine (Bundtzen et al. 1999). The first pit operation at the Kolmakof Mine was opened by Mr. William Holoday in approximately 1940 (Bundtzen et al. 1999). After World War II, Mr. Dean Rhehard constructed a gravity-feed mill at the site (Bundtzen et al. 1999). From 1950 to 1953, Mr. Willie Rabideau held the property (Bundtzen et al. 1999). In 1954, strip mining operations were initiated by the Western Alaska Mining Company (Bundtzen et al. 1999). The Rhehard-Holoday partnership (R&H Mining) mined mercury from 1969 to 1970 and conducted an exploratory program at the mine from 1969 to 1972 (Bundtzen et al. 1999). The BLM (1994) mining claims records indicate that in 1993, R&H Mining abandoned its claims to the Kolmakof Mine. The site is owned by the BLM. Under ANILCA, the Calista Corporation, the Village of Napaimute, and TKC have selected lands at the site which are currently held in trust by the BLM. The

Village of Napaimute is generally represented by TKC. Sampling off-site is planned to occur on land owned by BLM, TKC, and the Calista Corporation.

1.2.2 Site Operations and Source Characteristics

The Kolmakof Mine has been prospected and mined from 1881 to 1993. The principal mineral collected was cinnabar (mercury sulfide). Mining practices have ranged from lode mining to open pit and strip mining. Workings at the mine consist of a caved adit and a caved shaft, 29 trenches having a cumulative length of 600 feet, and several bulldozed trenches (USGS 1965). Elemental mercury is liberated from the ore by roasting it in a retort. The cinnabar ore is decomposed, releasing volatile mercury and sulfur dioxide (Babor et al. 1955). The mercury vapor then is condensed in a suitable cooled receiver (Babor et al. 1955). In 1910, two flasks (152 pounds) of elemental mercury were recovered from a homemade retort (USGS 1965, 1967). Total production from the mine is estimated at 250 flasks (19,000 pounds or 8,618 kilograms; Bundtzen et al. 1999). The main contaminants of concern at the site are elemental mercury and organo-mercury compounds with other toxic metals that may have been concentrated and released as a result of mining operations.

1.2.3 Site Characterization

This section summarizes previous site investigations (Section 1.2.3.1), discusses migration/exposure pathways and targets (Section 1.2.3.2), and describes areas of potential contamination (Section 1.2.3.3).

1.2.3.1 Previous Site Investigations

In 1994, the USGS published a study of the mercury contents in fish, stream sediments, and stream water samples from mercury deposits in southwestern Alaska (Gray et al. 1994). The study indicates mercury in fish tissue and stream sediments in the Kuskokwim and Kolmakof Rivers. Concentrations of mercury in arctic grayling (*Thymallus arcticus*) up to 0.42 part per million (ppm) in muscle tissue and 0.92 ppm in liver tissue collected from the Kolmakof River were below the established Food and Drug Administration action level for edible fish, but above background values of 0.07 to 0.20 ppm in muscle tissue and 0.08 to 0.27 ppm in liver tissue (Gray et al. 1994). The site studied on the Kolmakof River is downstream of natural mercury veins. Concentrations of mercury in sediment samples (up to 28 ppm) collected from the Kuskokwim River, adjacent to the mine site, were elevated above background concentrations (up to 0.45 ppm; Gray et al. 1994). However, the background samples were collected from areas with no known naturally occurring mercury lodes. No additional environmental investigations of the site have been identified.

On July 22, 1999, the START performed a site visit before implementation of the sampling event. The START observed the five buildings at the lower camp. Four of the buildings were freshly painted, and the lower camp appeared to be beneficially used as a hunting camp. The mine mill and retort located at the upper camp were not visible because of overgrowth of shrubs and trees. The tailings piles are overgrown and eroding down the bluff into the Kuskokwim River. There were no visible signs of stressed vegetation or stained soil.

1.2.3.2 Migration/Exposure Pathways and Targets

This section discusses the groundwater migration pathway, the surface water migration pathway, the soil exposure pathway, and the air migration pathway. Figures 1-4 and 1-5 illustrate the 4-mile-radius site range of influence and the 15-mile target distance limit (TDL).

1.2.3.2.1 Groundwater Migration Pathway

Soils at the Kolmakof Mine are derived from alluvium and bedrock. Histic pergelic cryaquepts to typic cryorthods dominate the soils, with lesser areas of pergelic cryaquepts and barren, rough, mountainous land (Rieger et al. 1979). Gravel is a large component of the Histic pergelic cryaquepts (Rieger et al. 1979). On north-facing slopes and on foot slopes, the permafrost table is shallow (10 to 24 inches below ground surface [bgs]) and the soils are poorly drained (Rieger et al. 1979). Soils range from gray mottled silt loam to gravelly silt loam. Typic cryorthods occur on south-facing slopes (Rieger et al. 1979). These soils, 20 to 40 inches thick, are well-drained with a thin albic horizon overlying a dark reddish brown to dark brown gravelly silt loam spodic horizon (Rieger et al. 1979). A dark grayish brown, very gravelly silt loam overlies the spodic horizon (Rieger et al. 1979). The less common pergelic cryaquepts consist of poorly drained, gravelly loam that extends 20 to 30 inches to permafrost (Rieger et al. 1979). The sediments underlying the soils consist mainly of alluvium with minor amounts of loess. Fluvial deposits occur along the riverbanks. These deposits consist of silt and sand with some interbedded gravel units (Péwé 1975). Permafrost up to 30 feet thick may be encountered (Péwé 1975). No wells have been drilled in the area; hence, there is little indication of the thicknesses of layers. Bedrock of the Kolmakof Mine region consists of Cretaceous Kuskokwim Group graywackes and shales (USGS 1965), the Triassic to Cretaceous Gemuk Group, and the Paleozoic Holitna Group. The Kuskokwim sedimentary sequence was deposited 136 to 65 million years ago as turbidite fan, foreslope, shallow marine, and shelf facies within a southwest-trending, fault-controlled basin (Gray et al. 1997). Late Cretaceous and early Tertiary mafic to felsic sills also occur (USGS 1965). Most of the mined cinnabar was associated with sills. Cinnabar occurs as veinlets within the sills, as pods in the shear zone on the edges of sills, and in fractures associated with the shear zones (Webber et al. 1947; USGS 1965).

No groundwater well information for the Kolmakof Mine is available (USGS 1999; ADNR 1999; USPHS 1999). No permanent residence or nearby population exists within a 4-mile radius of the site. The nearest permanent year-round residence is approximately 18 miles downstream in Aniak, Alaska. A summer "fish camp" cottage is located approximately 2 miles downstream of the upper camp along the north shore of the Kuskokwim River. Access to the site is uncontrolled but possible only by boat or aircraft. No terrestrial-sensitive environments are known to occur at the site.

1.2.3.2.2 Surface Water Migration Pathway

The Kolmakof Mine is located on a bluff along the north bank of the Kuskokwim River approximately 18 miles upstream from Aniak. The site is divided into two areas:

- The lower camp located on the north shore of the Kuskokwim River near the mouth of the Kolmakof River; and
- The upper camp located on the bluff downstream and west of the lower camp.

The Kolmakof River is located east of the lower camp and flows south to a confluence which discharges into the Kuskokwim River. No potential sources of Comprehensive Environmental Response, Compensation, and Liability Act hazardous substances are associated with the lower camp. Mine tailings are eroding into the Kuskokwim River at the upper camp, and surface water runoff from the north side of the tailings may flow east and discharge into a large wetland that fronts the Kolmakof River. The surface water TDL begins at the probable point of entry (PPE) to the wetland east of the site, continues down the Kolmakof River to the Kuskokwim River and then downstream along the Kuskokwim River to the eroding mine tailings, and continues downstream for 15 miles. The total distance to the PPE from the upper camp to the wetland east of the site is approximately 1 mile. The average annual discharge for the Kuskokwim River is 40,920 cubic feet per second (cfs) measured at Crooked Creek approximately 25 miles upstream of the site (USGS 1989). No flow data for the Kolmakof River are available. The START estimates the flow to be approximately 250 cfs. No flood data are available for the site. The upper camp is assumed to not be in a flood plain. The lower camp is assumed to be in a five-year flood plain because of the proximity to the Kuskokwim River and Kolmakof River.

The two-year, 24-hour rainfall event for the site is 1.5 inches (ENRI 1992). Aniak, located 18 miles downstream from the site, is the closest precipitation measurement station. The average annual precipitation for Aniak is 20.58 inches, and the actual evapotranspiration is 15.28 inches; thus, the net annual precipitation is calculated to be 5.3 inches (Patric and Black 1968). The upgradient drainage area estimated from a topographic map is 80 acres for the upper camp and an additional 80 acres for the lower camp (USGS 1973, 1972). Rieger et al. (1979) mapped approximately 85% of the soils at the site as

Histic pergelic cryaquepts to typic cryorthods. Approximately 10% of the site is mapped as pergelic cryaquepts. No more than 5% of the site is mapped as barren, rough, mountainous land (Rieger et al. 1979). Histic pergelic cryaquepts have hilly to steep topographic associations (Rieger et al. 1979). Although described as loamy, Histic pergelic cryaquepts are poorly drained with a thick, peaty surface mat underlain by mottled gray to dark gray silt loam. Black streaks of organic matter typically occur, and permafrost is common (Rieger et al. 1979). Of nearly equal proportion are typic cryorthods, which also are associated with hilly to steep topography but lack underlying permafrost and thus are more typical of south-facing slopes. Typic cryorthods have a thin, gray silt loam horizon overlying a dark brown to dark reddish brown silt loam spodic horizon. An olive to olive-brown silt loam to gravelly silt loam underlies the spodic horizon. Thus, the dominant surficial soils are presumed to be moderately fine-textured soils with low infiltration rates.

In Alaska, all surface water is protected for drinking water unless otherwise specified. Surface water within the 15-mile TDL is protected for drinking water use and is not known or expected to be used for irrigation of commercial food crops or commercial forage crops, for watering of commercial livestock, as an ingredient in commercial food preparation, or as a major or designated water recreation area.

The Alaska Department of Fish and Game (ADFG), Subsistence Division, maintains a database of subsistence harvest throughout the state (Scott 1997). This database provides data for the number of individuals harvested and the pounds harvested per year for subsistence in the community of Sleetmute. Sleetmute is the nearest community to Kolmakof Mine that is reported in the ADFG subsistence database. Based on the location of Sleetmute relative to the site, 10% of the total year's subsistence harvest documented in the ADFG database for Sleetmute was assumed to occur within 15 miles of the site, and these values are reported in Table 1-1.

The ADFG has tabulated the sport fishing harvest for major fisheries on the Kuskokwim River drainage above the Aniak River (Howe et al. 1998). The 1997 annual total harvest for the Kuskokwim River drainage above the Aniak River consisted of 195 Chinook salmon (*Oncorhynchus tshawytscha*), 860 coho salmon (*O. kisutch*), 37 sockeye salmon (*O. nerka*), 22 pink salmon (*O. gorbuscha*), 232 Dolly Varden (*Salvelinus malma*), 250 arctic grayling (*Thymallus arcticus*), 251 sheefish (*Stenodus leucichthys*), and 239 northern pike (*Esox lucius*; Howe et al. 1998). However, it is unknown how much, if any, of this harvest occurs within 15 miles of the site. Based on the location of the Kolmakof Mine relative to the reported sport fishery area of the Kuskokwim River drainage above the Aniak River only, 10% of the total sport fish harvest for this drainage is assumed to occur within 15 miles of the site, and these values are reported in Table 1-1. The pounds of fish were calculated by multiplying the number of fish harvested by the estimated weight based on an assumed average fish weight for the species.

No commercial fisheries exist within the 15-mile TDL (ADFG 1999). The entire fishing harvest of 3,225 pounds per year within 15 miles of the site is summarized in Table 1-1. No federally listed threatened or endangered species are known to exist within 4 miles of the site. However, the recently delisted American peregrine falcon (*Falco peregrinus*) is known to nest within 4 miles of the site, but not along the 15-mile TDL (USFWS 1999).

The ADFG (1999) has identified the Kuskokwim River as a critical migratory pathway for anadromous fish species; therefore, the waters within 15 miles of the site are considered critical migratory pathways or feeding areas for the maintenance of anadromous fish populations. An approximately 800-acre, palustrine emergent, scrub shrub wetland is located east of the site adjacent to the Kolmakof River (USFWS 1994). The total wetlands frontage within 15 miles of the site is approximately 5 linear miles.

1.2.3.2.3 Soil Exposure Pathway

The nearest year-round residence to the site is approximately 18 miles downstream in Aniak. A summer "fish camp" cottage is located approximately 2 miles downstream of the Kolmakof Mine along the Kuskokwim River. Access to the site is uncontrolled but is possible by boat or aircraft. No terrestrial-sensitive environments are known to occur at the site. No commercial agriculture or silviculture area or designated recreation area occurs within a 4-mile radius of the site. No resident or nearby population exists within a 1-mile travel distance of the site.

1.2.3.2.4 Air Migration Pathway

No permanent residences are within 4 miles of the site; however, during the START site visit, a summer residence was noted approximately 2 miles downstream of the site along the Kuskokwim River (USBC 1990). The Kolmakof Mine is located on a bluff along the north bank of the Kuskokwim River approximately 18 miles upstream from Aniak. The USFWS has generated wetlands inventory maps for the area. The total wetlands acreage within 4 miles of the site is approximately 6,026. No federally listed threatened or endangered species are known to exist within 4 miles of the site. However, the recently delisted American peregrine falcon (*Falco peregrinus*) is known to nest within 4 miles of the site (USFWS 1999). No other sensitive environments are known to occur within 4 miles of the site. No commercial agriculture or silviculture area or designated recreation area occurs within a 4-mile radius of the site. Table 1-2 provides populations and wetlands acreage by distance ring within 4 miles of the site.

1.2.3.3 Areas of Potential Contamination

Sampling under the Kolmakof Mine PA/SI will be conducted at those areas considered potential contamination sources and at areas that may have been contaminated by the migration of hazardous substances from sources on site. Based on a review of background information and a site visit, the following areas or features have been identified for inspection under the Kolmakof Mine PA/SI:

Potential Sources:

- **Tailings Piles.** Tailing piles exist from the mercury mining activities that have occurred at the upper camp. Potential contaminants of concern are metals, particularly mercury and its various species; and
- **Mill and Retort.** The mill and retort located at the upper camp were used to process the ore and purify the mercury. Potential contaminants of concern are metals, particularly mercury and its various species.

Potential Receptors:

- **Kuskokwim River Sediments.** The bluff and tailings located at the upper camp are eroding into the Kuskokwim River. Sport and subsistence fishing and harvesting occur in the Kuskokwim River. Additionally, the Kuskokwim River is a critical migratory pathway for anadromous fish. Potential contaminants of concern are metals, in particular mercury and its various species; and
- **Wetlands Sediments and Surface Water.** A potential drainage pathway exists from the mine tailings into a wetlands area east of the site. Potential contaminants of concern are metals, particularly mercury and its various species.

1.3 PROJECT/TASK DESCRIPTION AND SCHEDULE

This section provides the project description (Section 1.3.1) and proposed schedule (Section 1.3.2).

1.3.1 Project Description

This section defines the objectives and scope for performing the PA/SI activities at the Kolmakof Mine. The main goals for the PA/SI are:

- Collect and analyze samples to characterize the potential sources discussed in Section 1.2.3.3;
- Collect and analyze samples to determine off-site migration of contaminants;
- Provide the EPA with adequate information to determine whether the site is eligible for placement on the National Priorities List (NPL); and
- Document a threat or potential threat to public health or the environment posed by the site.

1.3.2 Schedule

The schedule for implementing the Kolmakof Mine PA/SI is intended to be used as a guide. Adjustments to the implementation dates and the estimated project duration may be necessary to account for variable unforeseen or unavoidable conditions that the field team may encounter. Examples include inclement weather, difficulties in accessing a sampling site, or additional time needed to complete a task. Any significant schedule changes that arise in the field will be discussed with the TM at the earliest possible convenience. The proposed schedule of project work is as follows:

Activity	Start	Complete
Mobilize to Site	5/30/00	5/31/00
Sample Collection Activities	6/1/00	6/3/00
Laboratory Receipt of Samples	6/6/00	6/6/00
Demobilize from Site	6/3/00	6/3/00
Completion of Laboratory Analysis (2 weeks)	6/6/00	6/21/00
Validation of Laboratory Data (2 weeks)	6/21/00	7/6/00
Write Project Report (6 weeks)	7/6/00	8/18/00
Target Project Completion Date	9/15/00	9/15/00

1.4 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The project data quality objectives (DQOs) are to provide valid data of known and documented quality to characterize sources, determine off-site migration of contaminants, determine whether the site is eligible for placement on the NPL, and document any threat(s) or potential threat(s) to public health or the environment posed by the site. The DQO process to be applied to this project will follow that described in the EPA (1994c) document, *Guidance for the Data Quality Objectives Process.*

1.5 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

No special training requirements or certifications are required for this project except for the 40-hour Hazardous Waste Operations and Emergency Response class and annual refreshers. Health and safety procedures for E & E personnel are addressed in the E & E site-specific HSP. As previously discussed (Section 1.2), this document is maintained in E & E's Seattle, Washington, office. Included in the plan are descriptions of anticipated chemical and physical hazards, required levels of protection, health and safety monitoring requirements and action levels, personal decontamination procedures, and emergency procedures.

1.6 DOCUMENTATION AND RECORDS

This document is meant to be combined with information presented in E & E's QAPjP (E & E 1996a) for the START, Region 10. This information is covered in this SQAP by the Standard Operating Procedures (SOPs) found in Appendix A, the commercial laboratory Statement of Work, and the commercial laboratory QA Manual,

which will be reviewed by E & E before initiation of field activities. A copy of the START QAPjP is available in E & E's Seattle, Washington, office. Standards contained in the SOPs, the START QAPjP, and the QMP will be used to ensure the validity of data generated by E & E for this project.

Following completion of fieldwork and receipt of analytical data, a report summarizing project findings will be prepared. Project files, including work plans, reports, analytical data packages, correspondence, chain-of-custody (COC) documentation, logbooks, corrective action forms, referenced materials, and photographs, will be provided to the EPA TM at the close of the project. Furthermore, a CD-ROM containing the final deliverables and photographs also will be provided.

Table 1-1

ANNUAL FISH HARVEST WITHIN 15 MILES OF THE SITE
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

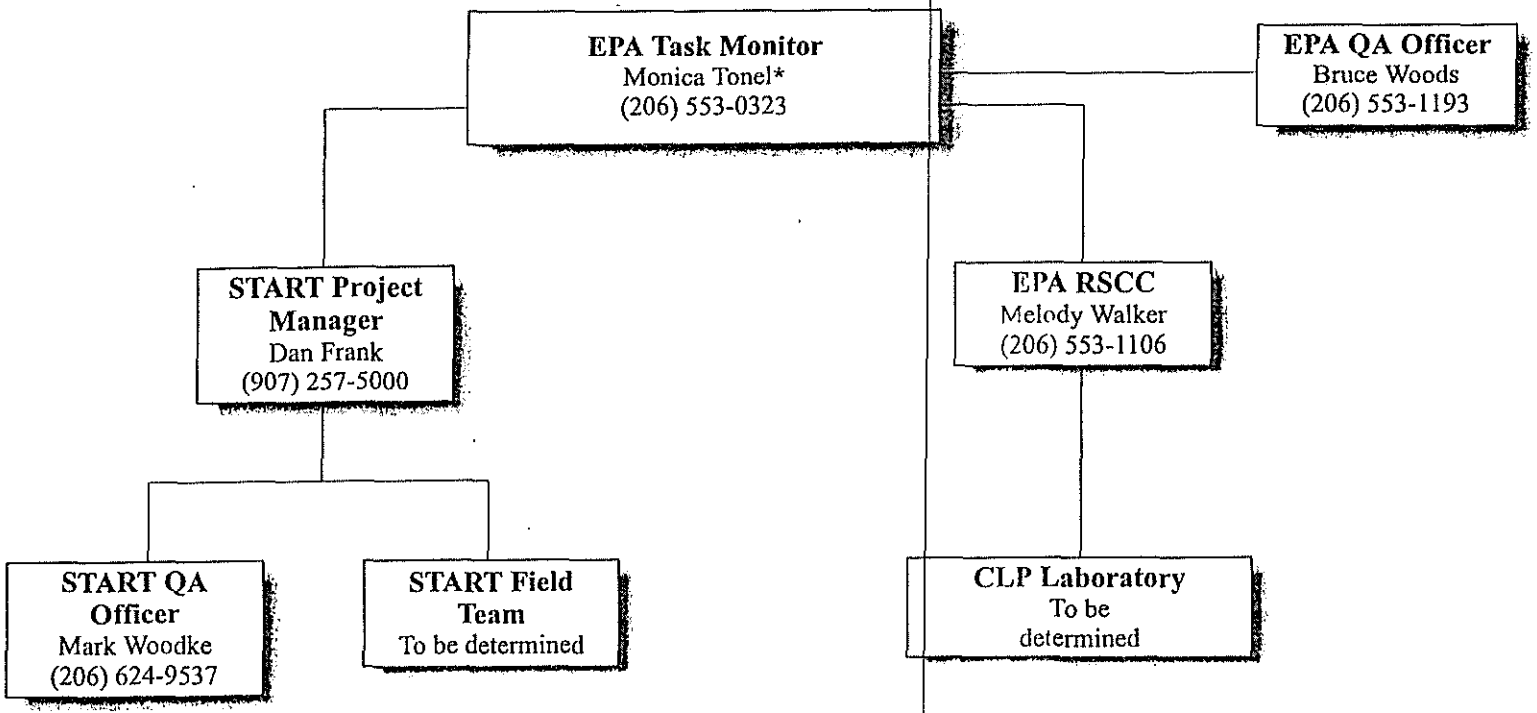
Subsistence Harvest		
Type of Fish	**Number of Fish**	**Pounds of Fish**
Chum salmon (*Oncorhynchus kata*)	197	985
Coho salmon (*O. kisutch*)	109	513
Chinook salmon (*O. tshawytscha*)	18	206
Pink salmon (*O. gorbuscha*)	5	13
Sockeye salmon (*O. nerka*)	77	413
Total Subsistence Harvest	**406**	**2,130**
Sport Fish Harvest		
Chinook salmon (*Oncorhynchus tshawytscha*)	20	230
Coho salmon (*O. kisutch*)	86	407
Sockeye salmon (*O. nerka*)	4	22
Pink salmon (*O. gorbuscha*)	2	5
Dolly Varden (*Salvelinus malma*)	23	109[a]
Arctic grayling (*Thymallus arcticus*)	25	39[a]
Sheefish (*Stenodus leucichthys*)	25	125[a]
Northern pike (*Esox lucius*)	24	158[a]
Total Sport Fish Harvest	**209**	**1,095**
Total Harvest	—	**3,225**

[a] Estimated weight based on an assumed average fish weight for the species.
Source: Scott 1997; Howe et. al. 1998.

Table 1-2

POPULATIONS AND WETLANDS ACREAGE WITHIN A 4-MILE RADIUS
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

DISTANCE (MILES)	RESIDENTS	WETLANDS ACREAGE
On a source	0	0
0 to ¼	0	0
¼ to ½	0	0
½ to 1	0	26
1 to 2	0	1,280
2 to 3	0	2,000
3 to 4	0	2,720
Total	**0**	**6,026**



KEY:

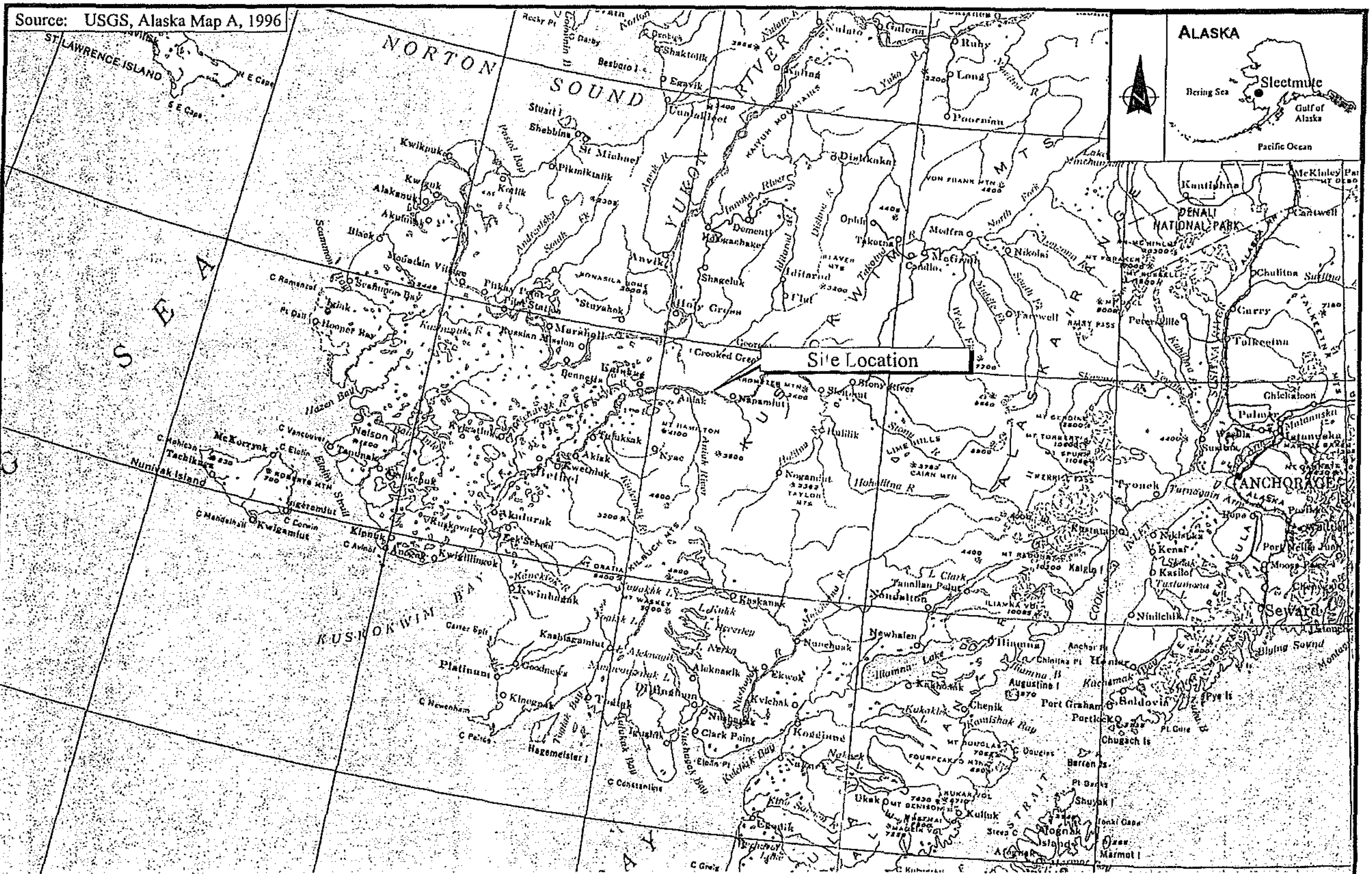
* Approving Authority

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

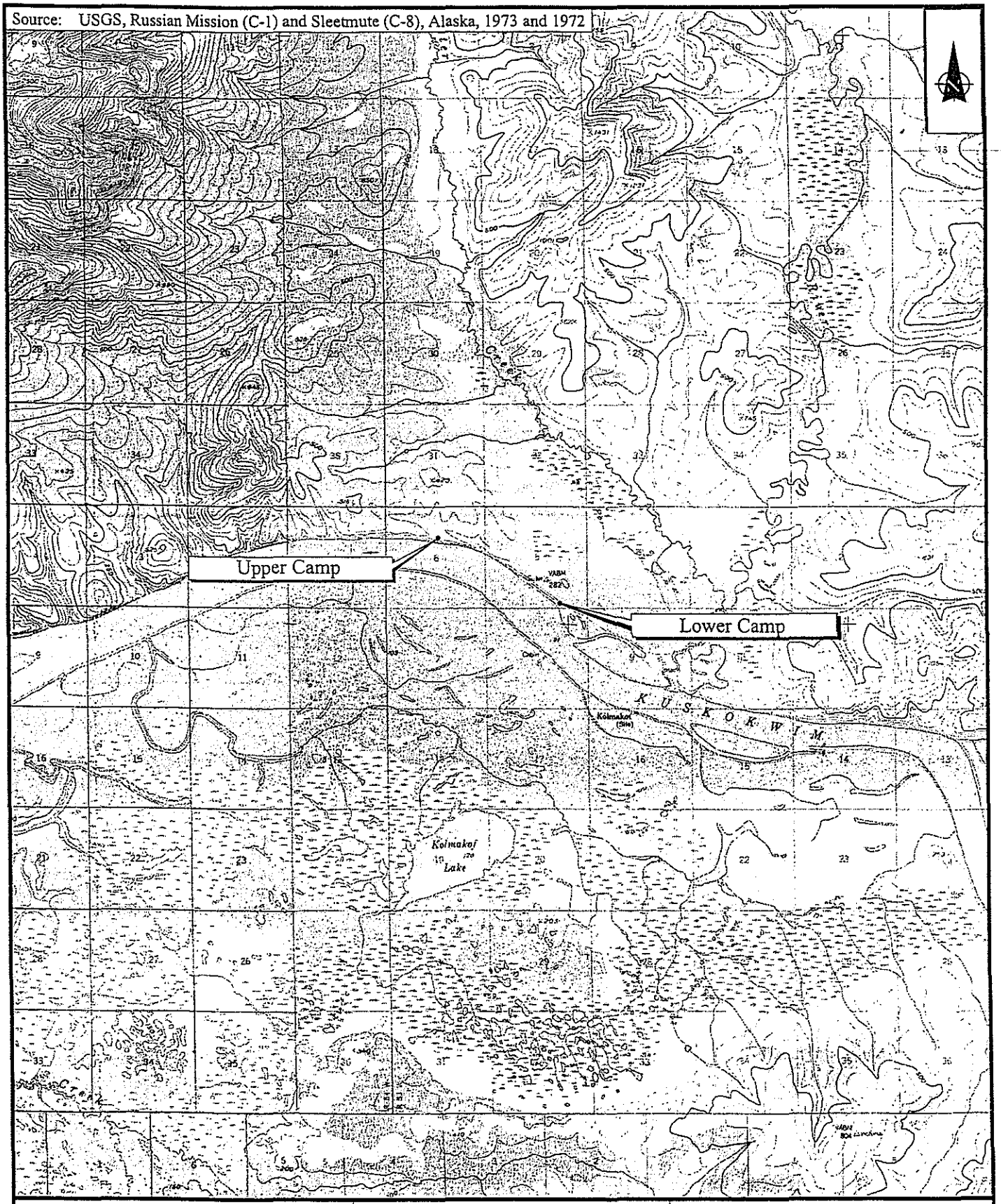
KOLMAKOF MINE SITE
Bethel, Alaska

Figure 1-1
PROJECT ORGANIZATION CHART

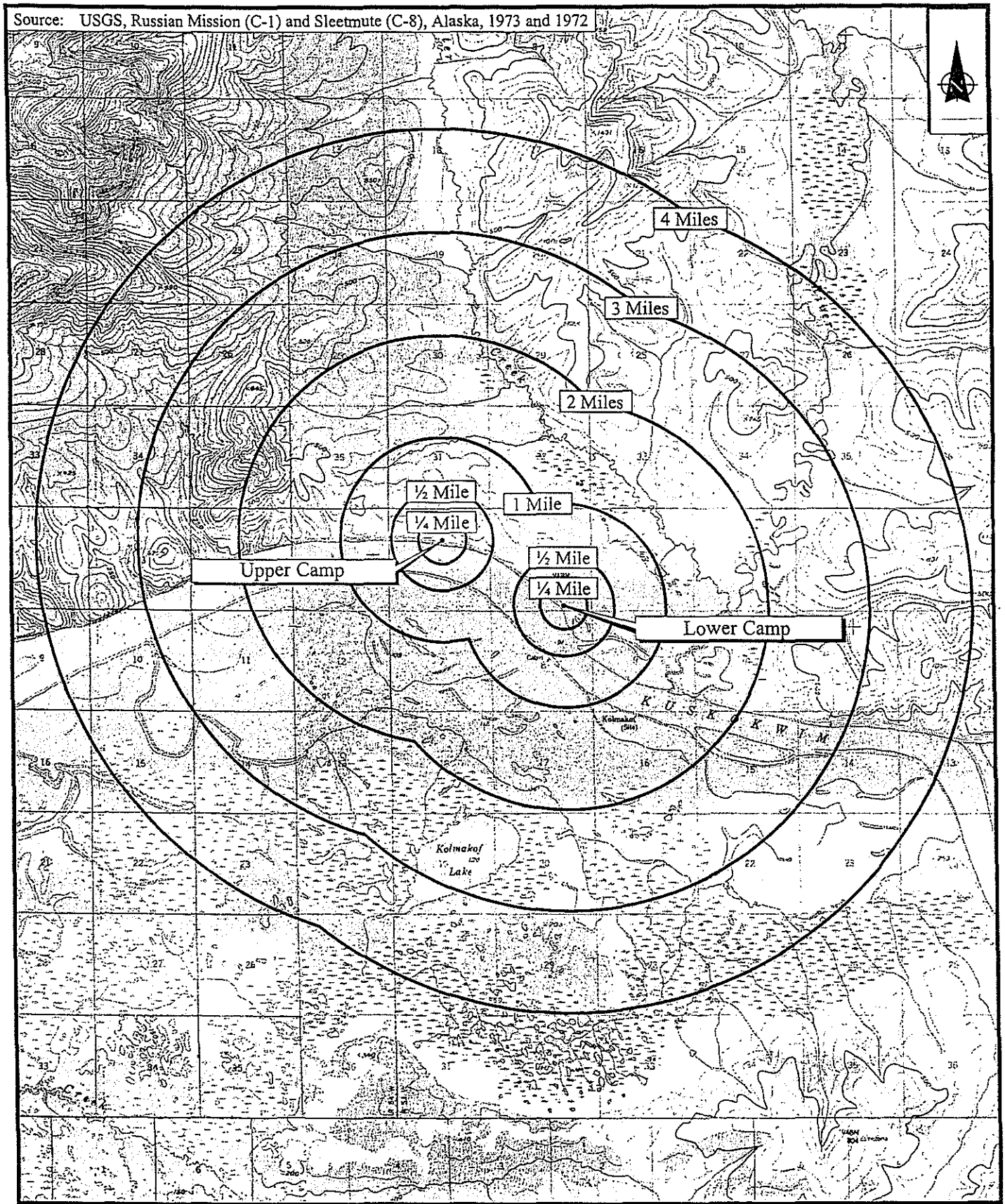
Drawn:	Date	Job No.	Dwg.No.
AES	12/21/99	DE0201SIT0	DE0201 1-1



ecology and environment, inc. International Specialists in the Environment Anchorage, Alaska	KOLMAKOF MINE SITE Bethel, Alaska	Figure 1-2 SITE VICINITY MAP		
	0 40 80 Approximate Scale in Miles	Drawn: AES	Date 12/21/99	Job No. DE0201SIT0	Dwg.No. DE0201 1-2



ecology and environment, inc. International Specialists in the Environment Anchorage, Alaska	KOLMAKOF MINE SITE Bethel, Alaska	Figure 1-3 SITE LOCATION MAP			
	0 .5 1 Approximate Scale in Miles	Drawn: AES	DATE: 12/21/99	JOB NO. DE0201SIT0	Dwg.No. DE0201 1-3



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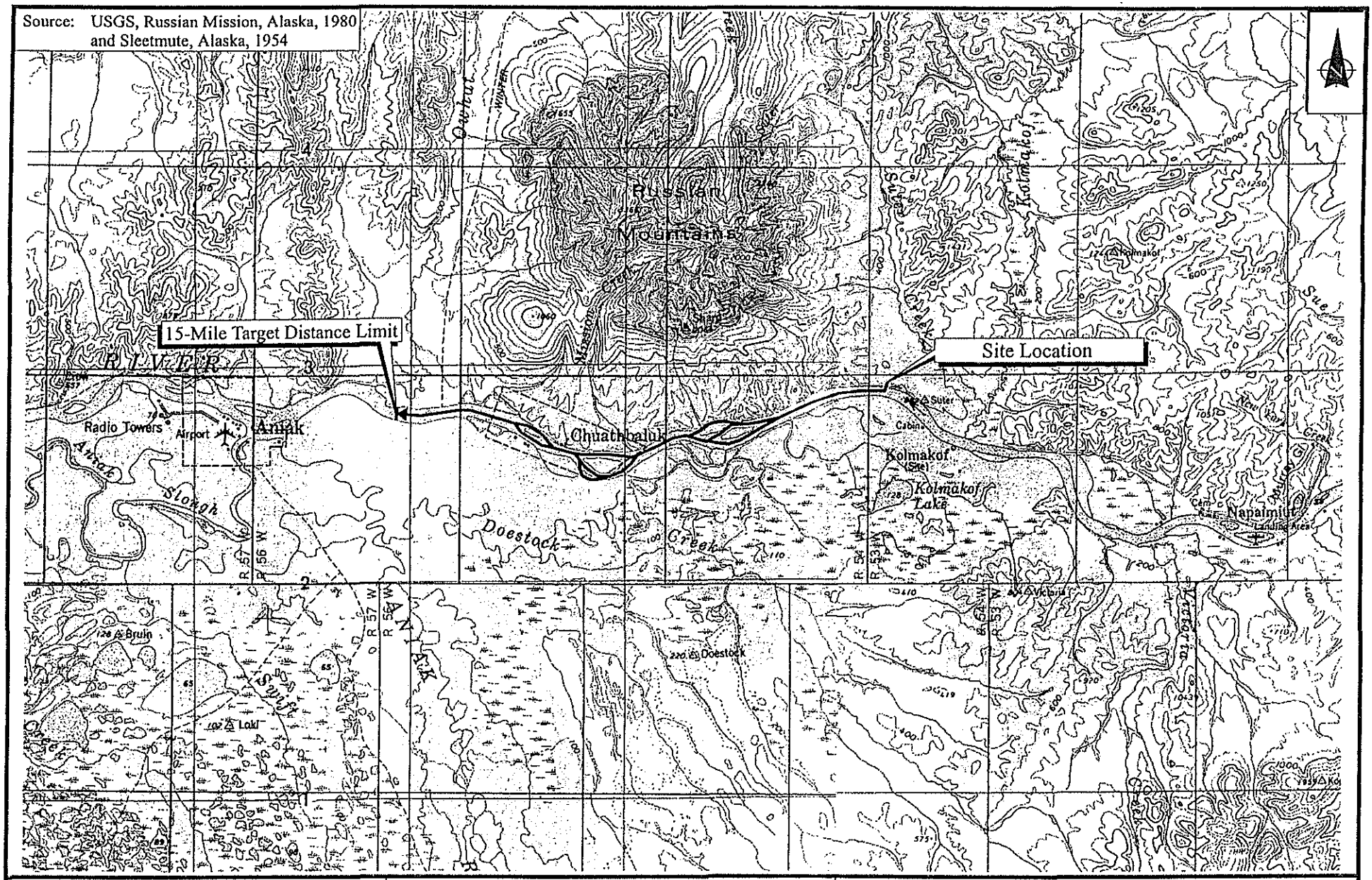
Anchorage, Alaska

KOLMAKOF MINE SITE
Bethel, Alaska

Figure 1-4
4-MILE MAP

0 5 1
Approximate Scale in Miles

Drawn:	DATE:	JOB NO.	Dwg.No.
AES	12/21/99	DE0201SIT0	DE0201 1-4



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Anchorage, Alaska

KOLMAKOF MINE SITE
Bethel, Alaska

Figure 1-5
15-MILE MAP

0 2.5 5
Approximate Scale in Miles

Drawn:	Date	Job No.	Dwg.No.
AES	12/21/99	DE0201SIT0	DE0201 1-5

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intentionally left blank.

2. MEASUREMENT/DATA ACQUISITION

2.1 SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

During the Kolmakof Mine PA/SI, samples will be collected from locations or features considered to be potential contamination sources, from selected potential hazardous substance migration pathways, and from potential targets in those pathways. The locations or features to be sampled were determined based on information derived from a review of background information, from a site visit conducted by E & E personnel, and from interviews with site representatives. Table 2-1 provides information regarding the sampling design and whether the measurement classifications are considered critical or noncritical.

At the time of sampling, site-specific conditions (i.e., topography or visual evidence of contamination) will be evaluated and incorporated, when applicable, into the placement of sampling locations. Other conditions potentially contributing to deviations from the projected sampling locations include new observations or information obtained in the field that warrant an altered sampling approach, difficulty in reaching a desired soil sampling depth caused by adverse soil conditions or obstructions, or limited access to a sampling location. Significant deviations from the planned sampling locations or number of samples to be collected will be discussed with the EPA TM before implementation and will be documented on a Sample Plan Alteration form. A sample form is included in Appendix B. Every attempt will be made to collect representative samples with the equipment being used.

This section describes sample locations (Section 2.1.1); the Global Positioning System (GPS; Section 2.1.2); logistics (Section 2.1.3); cooler return (Section 2.1.4); coordination with federal, state, and local authorities (Section 2.1.5); and the proposed schedule (Section 2.1.6).

2.1.1 Sample Locations

Sample locations were selected to achieve the objectives discussed in Section 1.3.1. All samples will be submitted for off-site fixed laboratory analysis for Target Analyte List metals (Contract Laboratory Program Analytical Services ILM04.0). Additionally, samples will be analyzed for mercury speciation (methyl mercury via gas chromatography/atomic fluorescent spectrometry). The mercury speciation analysis will help START distinguish the various forms of mercury. This is important because mercury species vary in mobility, availability, and potential toxicity. Proposed sample locations are illustrated in Figure 2-1. A summary of sampling locations and rationale is provided below:

- **Tailings Piles.** Five surface soil samples and one subsurface soil sample will be collected from the tailings piles. These samples are meant to characterize the tailings piles as potential sources at the site;
- **Mill and Retort.** If the mine mill and retort can be accessed, at least one surface soil sample will be collected from areas of potential contamination. Samples collected in this area are meant to characterize the soils surrounding the mine mill and retort as potential sources at the site;
- **Kuskokwim River Sediments.** Five near-shore sediment samples will be collected from the bank of the Kuskokwim River. Four samples will be collected from the area of the tailings erosion and one from below the "fish camp" cottage. A surface water sample will be collected from the Kuskokwim River at the "fish camp" cottage provided that the river is used as a drinking water source at the cottage. These samples are meant to characterize any potential tailings in the Kuskokwim River, to determine migration of contaminants, and to document any potential contamination in drinking water at the "fish camp" cottage;
- **Wetlands Sediment and Surface Water.** Three collocated sediment and surface water samples will be collected from the wetland east of the site. Samples will be collected at the PPE into the wetland, 0.1 mile into the wetland, and 1.1 miles into the wetland. This wetland may be impacted by runoff from the mine. These samples are meant to determine off-site migration of contaminants and to document whether contamination exists at the target; and
- **Background Samples.** Five representative background samples will be collected. One collocated sediment and surface water sample will be collected from the wetland northeast of the site. One sediment sample will be collected from the Kuskokwim River upstream of the Kolmakof River. A second sediment sample will be collected from the Kolmakof River. The final background sample will be collected from surface soils east of the Kolmakof River. Every effort will made to collect background samples in areas of natural mercury lodes to account for naturally occurring background conditions.

2.1.2 Global Positioning System

A GPS rover unit with data logger will be used to identify the geographic coordinates of every sample collected, and to delineate the boundaries of the potential source areas. GPS coordinates will be provided as an appendix in the final Kolmakof Mine PA/SI Report. From the Internet, the START will obtain base station data from the local source "KEN1" in order to deferentially correct rover unit data.

2.1.3 Logistics

The Kolmakof Mine is accessible only by boat or helicopter. START was informed that because of unpredictable weather conditions, traveling to the site may be difficult and delays should be expected. START personnel and equipment will fly via a commercial airline to Aniak, Alaska, and connect with a chartered helicopter from Aniak to the site. The property owner has provided consent to access the property for the PA/SI activities.

Sample aliquots collected for CLP laboratory analysis will be delivered to the Manchester Laboratory, or an alternative laboratory as directed by the EPA. Samples collected for mercury speciation will be transported to a commercial laboratory under contract to the START. All samples will be shipped at the end of the fieldwork via express delivery by a commercial airline. Sample control and shipping are discussed in Section 2.3.

2.1.4 Cooler Return

For laboratories other than the EPA Manchester Laboratory, E & E will provide a completed airbill accompanied by a plastic envelope with adhesive back and an address label in the COC bags taped to the lid inside coolers so the laboratory can return the coolers to E & E. The airbills will contain the following notation: "Transportation is for the U.S. Environmental Protection Agency and the total actual transportation charges paid to the carrier(s) by the consignor or consignee shall be reimbursed by the Government, pursuant to cost reimbursement contract No. 68-W6-0008." This notation will enable the laboratories to return the sample coolers to E & E's warehouse. The airbills will be marked for second-day economy service and will contain the appropriate TDD number for shipment.

For the EPA Manchester Laboratory, an arrangement by E & E for cooler return in this manner is not required.

2.1.5 Coordination with Federal, State, and Local Authorities

The START will keep the TM apprized of field event progress and issues that may affect the schedule or outcome of the Kolmakof Mine PA/SI, discuss any problems encountered, inform the EPA of unusual contacts with the public or media, and obtain guidance from the EPA regarding project activities when required. Additionally, the START will notify the EPA RSCC of changes to the sampling schedule and provide shipping information regarding every sample shipment within 24 hours of shipment or before noon on Friday for Saturday delivery.

Before initiation of the Kolmakof Mine PA/SI field activities, the START will provide notification of the PA/SI to Ms. Denton of the BLM. The EPA TM will notify the relevant Native association representatives.

2.1.6 Schedule

The schedule for implementing the Kolmakof Mine PA/SI is intended to be used as a guide. Adjustments to the implementation dates and the estimated project duration may be necessary to account for variable unforeseen or unavoidable conditions that the field team may encounter. Examples include

inclement weather, difficulties in accessing a sampling site, or additional time needed to complete a task. Any significant schedule changes that arise in the field will be discussed with the TM at the earliest possible convenience.

The START is targeting the week of May 29, 2000 as the earliest period to conduct the Kolmakof Mine PA/SI fieldwork, which is estimated to take five days, including travel time to and from the site. This period comprises one day of mobilization, one day of demobilization, and three days to complete field activities. Outdoor work will be conducted during daylight hours only. This schedule does not account for possible delays due to weather. Mobilization for the Kolmakof Mine PA/SI will coincide with sampling activities at two nearby SIs. Sampling at these two sites is expected to take an additional two days each.

2.2 SAMPLING METHOD REQUIREMENTS

This section describes the sampling method (Section 2.2.1), sampling equipment decontamination (Section 2.2.2), investigation-derived wastes (IDWs; Section 2.2.3), and SOPs (Section 2.2.4).

2.2.1 Sampling Methods

The START PM will be responsible for ensuring that appropriate sample collection procedures are followed and will take appropriate actions to correct any deficiencies. All samples will be maintained under COC and will be stored and shipped in iced coolers.

Table 2-2 summarizes specific requirements for sample container size and type, sample preservation and holding times, and special handling requirements for samples to be submitted according to the method requirements. Table 2-3 presents the anticipated numbers and types of samples and analytical methods, and the number of QA/quality control (QC) samples expected to be collected at the site. The sampling methods for each medium are as follows:

- **Surface Soil Sampling.** Surface soil samples (0 to 6 inches bgs) will be collected using a dedicated Teflon or plastic spoon. Soil will be placed in a dedicated Teflon or plastic bowl, homogenized thoroughly with a plastic spoon, and placed into prelabeled sample containers. Visible mercury will be noted in the logbook. After the soil sample collection, the hole will be backfilled with the excavated soil;
- **Subsurface Soil Sampling.** Subsurface soil samples (2 to 3 feet bgs) will be collected with a dedicated stainless steel hand auger. Soil will be placed in a dedicated Teflon or plastic bowl, homogenized thoroughly with a plastic spoon, and placed into prelabeled sample containers. Visible mercury will be noted in the logbook. After the soil sample collection, the hole will be backfilled with the excavated soil;

- **Sediment Sampling.** Sediment samples will be collected by using a dedicated Teflon or plastic spoon or trowel. Sediment samples will be homogenized thoroughly in a dedicated Teflon or plastic bowl and placed into prelabeled sample containers. The samples will be collected from downstream to upstream, and collocated waters will be collected before sediment samples; and
- **Surface Water Sampling.** Surface water samples from the Kuskokwim River and the wetland will be collected either by hand-dipping the sample container into the water, if possible, or by creating a funnel to the sample container with a dedicated one-liter polyethylene sample bottle with the bottom of the bottle removed. Surface water samples will be collected from downstream to upstream. Additionally, water samples will be collected before sediment samples, and care will be taken to not disturb sediments.

2.2.2 Sampling Equipment Decontamination

To the greatest extent possible, disposable and/or dedicated personal protective and sampling equipment will be used to avoid cross-contamination. When required. decontamination will be conducted in a central location, upwind and away from suspected contaminant sources. The decontamination procedure for all stainless steel sampling equipment will consist of the following steps:

- Scrub to remove all visible material;
- Scrub with a brush using a nonphosphate detergent and potable water;
- Rinse with potable water;
- Rinse with diluted nitric acid;
- Rinse with deionized water; and
- Air dry.

2.2.3 Investigation-Derived Wastes

The START field team members will make every effort to minimize the generation of IDWs throughout the field event. All wastewater will be contained in one 10-gallon drum, labeled, and disposed of at an approved facility based on analytical results of a profile sample. Disposable personal protective clothing and sampling equipment generated during field activities will be rendered unusable by tearing (when appropriate), bagged in opaque plastic garbage bags, and disposed of at the Anchorage Municipal Landfill.

2.2.4 Standard Operating Procedures

The START will utilize the following SOPs (Appendix A) while performing field activities:

- Field Activities Logbooks;
- Sediment Sampling;
- Sample Packaging and Shipping;
- Surface Water Sampling;
- Soil Sampling;
- Site Entry Procedures; and
- Sampling Equipment Decontamination.

2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

This section describes sample identification and COC procedures that will be used for the Kolmakof Mine PA/SI field activities. The purpose of these procedures is to ensure that the quality of samples is maintained during collection, transportation, storage, and analysis. All COC requirements comply with E & E's SOPs for sample handling. All sample control and COC procedures will follow the EPA (1991) *User's Guide to the Contract Laboratory Program.*

Examples of sample documents used for custody purposes are provided in Appendix B and include the following:

- Sample identification numbers;
- Sample tags or labels;
- Custody seals;
- COC and traffic report records;
- Field logbooks;
- Sample collection forms;
- Analytical request forms; and
- Analytical records.

During the field effort, the site manager or delegate will be responsible for maintaining an inventory of these sample documents. This inventory will be recorded in a cross-referenced matrix of the following:

- Sample location;
- Sample identification number;
- Analyses requested and request form number(s);
- COC record numbers;
- Bottle lot numbers; and
- Airbill numbers.

Brief descriptions of the major sample identification and documentation records and forms are provided below.

2.3.1 Sample Identification

All samples will be identified using the sample numbers assigned by the EPA RSCC. Each sample label will be affixed to the jar and covered with clear tape. A sample tracking record will be kept as each sample is collected. The following will be recorded: location, matrix, sample number, observations, and depth. In addition to the EPA-assigned sample number, samples will be tracked with a field sample code system designed to allow easy reference to the sample's origin and type. The sample code key will not be provided to the laboratory. Table 2-4 summarizes the field sample code.

2.3.1.1 Sample Tags and Labels

Sample tags attached to or fixed around the sample container will be used to identify all samples collected in the field. The sample tags will be placed on bottles so as not to obscure any QA/QC lot numbers on the bottles, and sample information will be printed legibly. Field identification will be sufficient to enable cross-reference with the project logbook. For COC purposes, all QA/QC samples will be subject to the same custodial procedures and documentation as site samples.

To minimize handling of sample containers, labels will be completed before sample collection to the extent possible. In the field, the labels will be filled out completely using waterproof ink, then attached firmly to the sample containers and protected with clear tape. The sample label will provide the following information:

- Sample number;
- Sample location number;

- Date and time of collection;
- Analysis required; and
- pH and preservation (when applicable).

2.3.1.2 Custody Seals

Custody seals are preprinted gel-type seals, designed to break into small pieces if disturbed. Sample shipping containers (e.g., coolers, drums, and cardboard boxes, as appropriate) will be sealed in as many places as necessary to ensure security. Seals will be signed and dated before use. Clear tape will be placed over the seals to ensure that they are not broken accidentally during shipment. Upon receipt of shipment at the laboratory, the custodian will check (and certify by completing the package receipt log) that seals on shipping containers are intact.

2.3.1.3 Chain-of-Custody Records and Traffic Reports

For samples to be analyzed at a CLP laboratory, the COC record and analytical traffic report forms will be completed as described in the CLP User's Guide (EPA 1991). The COC record and analytical traffic reports will be completed fully at least in duplicate by the field technician designated by the site manager as responsible for sample shipment to the appropriate laboratory. Information specified on the COC record will contain the same level of detail found in the site logbook, except that the on-site measurement data will not be recorded. The custody record will include the following information:

- Name and company or organization of person collecting the samples;
- Date samples were collected;
- Type of sampling conducted (composite or grab);
- Sample number (using those assigned by the EPA RSCC);
- Location of sampling station (using the sample code system described in Table 2-4);
- Number and type of containers shipped;
- Analysis requested; and
- Signature of the person relinquishing the samples to the transporter, with the date and time of transfer noted and the signature of the designated sample custodian at the receiving facility.

If samples require rapid laboratory turnaround, the person completing the COC record will note these or similar constraints in the remarks section of the custody record.

The relinquishing individual will record all shipping data (e.g., airbill number, organization, time, and date) on the original custody record, which will be transported with the samples to the

laboratory and retained in the laboratory's file. Original and duplicate custody records, together with the airbill or delivery note, constitute a complete custody record. It is the site manager's responsibility to ensure that all records are consistent and that they become part of the permanent job file.

2.3.1.4 Field Logbooks and Data Forms

Field logbooks (or daily logs) and data forms are necessary to document daily activities and observations. Documentation will be sufficient to enable participants to reconstruct events that occurred during the project accurately and objectively at a later time. All daily logs will be kept in a bound notebook containing numbered pages. All entries will be made in waterproof ink, dated, and signed. No pages will be removed for any reason.

Minimum logbook content requirements are described in the E & E SOP entitled, *Preparation of Field Activities—Logbooks*. If corrections are necessary, they will be made by drawing a single line through the original entry (so that the original entry is legible) and writing the corrected entry alongside. The correction will be initialed and dated. Corrected errors may require a footnote explaining the correction.

2.3.1.5 Photographs

Photographs will be taken as directed by the team leader. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information concerning photographs will be noted in the project or task log:

- Date, time, and location where photograph was taken;
- Photographer;
- Weather conditions;
- Description of photograph taken;
- Sequential number of the photograph and the film roll number;
- Camera lens system used; and
- Direction.

2.3.2 Custody Procedures

The primary objective of COC procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody when it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

2.3.2.1 Field Custody Procedures

The following guidance will be used to ensure proper control of samples while in the field:

- As few people as possible will handle samples;
- Coolers or boxes containing cleaned bottles will be sealed with a custody tape seal during transport to the field or while in storage before use. Sample bottles from unsealed coolers or boxes, or bottles that appear to have been tampered with, will not be used;
- The sample collector will be responsible for the care and custody of collected samples until they are transferred to another person or dispatched properly under COC rules;
- The sample collector will record sample data in the field logbook; and
- The site team leader will determine whether proper custody procedures were followed during the fieldwork and will decide whether additional samples are required.

When transferring custody (i.e., releasing samples to a shipping agent), the following will apply:

- The coolers in which the samples are packed will be sealed and accompanied by two COC records. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the COC record. This record will document sample custody transfer;
- Samples will be dispatched to the laboratory for analysis with separate COC records accompanying each shipment. Shipping containers will be sealed with custody seals for shipment to the laboratory. The COC records will be signed by the relinquishing individual, and the method of shipment, name of courier, and other pertinent information will be entered in the COC record before placement in the shipping container;

- All shipments will be accompanied by COC records identifying their contents. The original record will accompany the shipment. The other copies will be distributed appropriately to the site team leader and site manager; and
- If sent by common carrier, a bill of lading will be used. Freight bills and bills of lading will be retained as part of the permanent documentation.

2.3.2.2 Laboratory Custody Procedures

A designated sample custodian at the laboratory will accept custody of the shipped samples from the carrier and enter preliminary information about the package into a package or sample receipt log, including the initials of the person delivering the package and the status of the custody seals on the coolers (i.e., broken versus unbroken). The custodian responsible for sample log-in will follow the laboratory's SOP for opening the package, checking the contents, and verifying that the information on the COC agrees with samples received. The commercial laboratory will follow its internal COC procedures as stated in the laboratory QA Manual.

2.4 ANALYTICAL METHOD REQUIREMENTS

This section discusses the analytical strategy (Section 2.4.1) and analytical methods (Section 2.4.2).

2.4.1 Analytical Strategy

Analysis of samples collected during this PA/SI will be performed by two separate laboratories. The EPA Manchester Laboratory is expected to perform all TAL metals analyses. The START-subcontracted laboratory, Columbia Analytical Services, Inc., will perform mercury speciation.

The analyses to be applied to samples sent to the laboratory are listed in Table 2-2. These analyses were selected based on the probable hazardous substances used or potentially released to the environment, given the known or suspected site usage.

2.4.2 Analytical Methods

EPA Manchester Laboratory analysis will take place under a rapid two-week turnaround time period (2 weeks for analysis and 2 weeks for validation) with validation by the EPA, Region 10 QA office. Hard-copy results from the Manchester Laboratory will be delivered to EPA upon completion of each sample delivery group. Electronic results will be delivered to the EPA upon project completion.

START-subcontracted laboratory analysis will take place under a two-week turnaround time period. Samples submitted for mercury specification will be analyzed within 48 hours of laboratory receipt to minimize the chance of species-shifting. The laboratories will be requested to homogenize the samples and collect aliquots from the bottom of the sample jars because elemental mercury may settle out

to the bottom of the sample containers. Hard-copy and electronic data results and CLP-equivalent deliverables from the subcontracted laboratory will be delivered to the START upon completion of each sample delivery group. Table 2-3 summarizes laboratory instrumentation and methods to be used for the Kolmakof Mine PA/SI.

If laboratory results exceed QC acceptance criteria, re-extraction and/or reanalysis will occur as indicated in the applicable analytical method. The respective laboratory analysts will be responsible for ensuring that appropriate sample analysis procedures are followed and will take appropriate actions to ensure correction of any deficiencies. A copy of the Statement of Work for the commercial laboratory analyses, including copies of the applicable analytical methods, is included in Appendix C.

2.5 QUALITY CONTROL REQUIREMENTS

QC checks for sample collection will be accomplished by a combination of COC protocols and laboratory QA as prescribed in the sampling or analytical methods. No QC samples (i.e., double blind performance evaluation samples) are planned for this activity outside normal laboratory QC criteria outlined in the analytical methods. In accordance with the objectives outlined in this document and the QA levels defined by the EPA, the EPA has defined the DQOs and has determined that the sampling and analyses performed under this sampling effort will conform to the definitive data without error and bias determination criteria.

2.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

The field equipment used during this project includes the GPS unit, a multiRae multi-gas analyzer, a mercury vapor analyzer (MVA), and a water quality meter. Testing, inspection, and maintenance of these instruments will be performed in accordance with the manufacturers' recommendations. Spare parts for the field equipment will be available from the manufacturer or regional representative generally within 24 hours.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

All instruments and equipment used during fixed laboratory sample analyses will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations, as well as criteria set forth in the applicable analytical methodology references and/or in accordance with the laboratory's QA Manual and SOPs.

For the field instrumentation GPS unit, multiRae multi-gas analyzer, and MVA, the calibration will be performed in accordance with the manufacturers' recommendations.

2.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

This information is covered by the SOPs, the START QAPjP, and the START QMP (E & E 1996b). Standards contained in these documents will be used to ensure the validity of data generated by E & E for this project. Sample jars are pre-cleaned by the manufacturer; certification documenting this is enclosed with each box of jars.

2.9 DATA ACQUISITION REQUIREMENTS (NONDIRECT MEASUREMENTS)

No data from other sources will be used.

2.10 DATA MANAGEMENT

This document is meant to be combined with information presented in E & E's QAPjP and QMP for the START, Region 10. Copies of the START QAPjP and QMP are available in E & E's Seattle, Washington, office. Standards contained in these documents will be used to ensure the validity of data generated by E & E for this project. Data validation will be performed as described in Section 4.1.2. Data tracking, storage, and retrieval are tracked on the TDD "blue sheet," which records where the paper and electronic data are located. All paper data are stored in locked file cabinets; access to these files is restricted to key START personnel. Electronic data are archived by TDD.

Table 2-1

SAMPLE INFORMATION SUMMARY
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

Project Sampling Location	Parameter/ Detection Limits	Design Rationale	Sampling Design Assumptions	Sample Selection Procedures	Measurement Classification (Critical/ Noncritical)	Non-standard Method Validation
Tailings piles	TAL metals/CRDL Hg Speciation/ 1 µg/kg	Confirm the source	Hazardous materials may have been released during the operation of the facility	Specific sample locations will be determined on site	Critical	N/A
Mill and retort	TAL metals/CRDL Hg Speciation/ 1 µg/kg	Confirm the source	Hazardous materials may have been released during the operation of the facility	Specific sample locations will be determined on site	Critical	N/A
Kuskokwim River sediments	TAL metals/CRDL Hg Speciation/ 1 µg/kg	Determine the presence of contaminants in the target	Contaminants may have migrated from the source areas to the river	Specific sample locations will be determined on site	Critical	N/A
Wetland	TAL metals/CRDL Hg Speciation/ 1 µg/kg and 1 µg/L	Determine the presence of contaminants in the target	Contaminants may have migrated from the source areas into the wetland	Specific sample locations will be determined on site	Critical	N/A

Key:

CRDL = Contract-required detection limit.
Critical = Required to achieve project objectives or limits on decision errors.
Hg = Mercury.
µg/kg = Micrograms per kilogram.
µg/L = Micrograms per liter.
N/A = Not applicable.
Noncritical = For informational purposes only or needed to provide background information.
TAL = Target Analyte List.

Table 2-2

SAMPLE ANALYSES SUMMARY
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

Matrix	Location[a]	Analytical Parameters and Method	Sample Preservation	Technical Holding Time[b]	Sample Container(s)
Soil	Kuskokwim River sediments (5 samples)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C	180 days from collection (28 days for mercury)	One 8-oz. wide-mouth glass jar with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C	48 hours from laboratory receipt	One 8-oz. wide-mouth glass jar with Teflon-lined lid
	Wetlands sediments (3 samples)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C	180 days from collection (28 days for mercury)	One 8-oz. wide-mouth glass jar with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C	48 hours from laboratory receipt	One 8-oz. wide-mouth glass jar with Teflon-lined lid
	Tailings piles (5 surface soil samples and 1 subsurface soil sample)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C	180 days from collection (28 days for mercury)	One 8-oz. wide-mouth glass jar with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C	48 hours from laboratory receipt	One 8-oz. wide-mouth glass jar with Teflon-lined lid
	Mine mill and retort (at least 1 surface soil sample)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C	180 days from collection (28 days for mercury)	One 8-oz. wide-mouth glass jar with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C	48 hours from laboratory receipt	One 8-oz. wide-mouth glass jar with Teflon-lined lid
	Background (1 soil sample and 3 sediment samples)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C	180 days from collection (28 days for mercury)	One 8-oz. wide-mouth glass jar with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C	48 hours from laboratory receipt	One 8-oz. wide-mouth glass jar with Teflon-lined lid

Table 2-2

SAMPLE ANALYSES SUMMARY
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

Matrix	Location[a]	Analytical Parameters and Method	Sample Preservation	Technical Holding Time[b]	Sample Container(s)
Water	Wetland surface water (4 samples)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C; HNO_3 to pH < 2	180 days from collection (28 days for mercury)	One 1-L high-density polyethylene bottle with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C; 0.1N H_2SO_4 0.06N HCl	48 hours from laboratory receipt	One 1-L high-density polyethylene bottle with Teflon-lined lid
	Background (1 surface water sample)	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C; HNO_3 to pH < 2	180 days from collection (28 days for mercury)	One 1-L high-density polyethylene bottle with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C; 0.1N H_2SO_4 0.06N HCl	48 hours from laboratory receipt	One 1-L high-density polyethylene bottle with Teflon-lined lid
	Rinsate blank	Target Analyte List metals (CLPAS) ILM04.0	Cool to 4°C ± 2°C; HNO_3 to pH < 2	180 days from collection (28 days for mercury)	One 1-L high-density polyethylene bottle with Teflon-lined lid
		Mercury speciation (GC/AFS)	Cool to 4°C ± 2°C; 0.1N H_2SO_4 0.06N HCl	48 hours from laboratory receipt	One 1-L high-density polyethylene bottle with Teflon-lined lid

a The number of samples presented is an estimate; the actual number of samples to be collected will be determined in the field.

b Technical holding times have been established only for water matrices. Water technical holding times were applied to sediment, soil, and product samples where applicable; in some cases, recommended sediment/soil holding times are listed.

Key:

C = Celsius.
CLPAS = Contract Laboratory Program Analytical Services.
GC/AFS = Gas chromatography/atomic fluorescent spectrometry.
H_2SO_4 = Sulfuric acid.
HCl = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter.
oz. = Ounce.

Table 2-3

QA/QC ANALYTICAL SUMMARY AND FIXED LABORATORY ANALYTICAL METHODS
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

Laboratory	Matrix	Parameters/Method	Method Description/ Detection Limits	Total Field Samples[a]/ Containers	QA/QC Sample Summary Analyses/Containers				Total Field and QA/QC Analyses/ Containers[e]
					Trip Blanks[b]	Rinsate Blanks[c]	Organic MS/MSD[d]	Inorganic MS/Dup[d]	
EPA, Region 10, or CLP laboratory	Soil/ sediment	TAL metals/ (CLPAS) ILM04.0	AA and ICP/ CRDL	19/19	0/0	N/A	N/A	1/0	20/19
Commercial laboratory		Mercury speciation (GC and AFS)	GC and AFS/ 1 µg/kg	19/19	0/0	N/A	N/A	1/0	20/19
EPA, Region 10, or CLP laboratory	Water	TAL metals/ (CLPAS) ILM04.0	AA & ICP/ CRDL	6/6	0/0	1/1 (auger)	N/A	1/1	8/8
Commercial laboratory		Mercury speciation (GC and AFS)	GC and AFS/ 1 µg/L	6/6	0/0	1/1 (auger)	N/A	1/1	8/8

a The total number of field samples is estimated.
b The total number of trip blanks could vary depending on the total number of sample shipments. This number is based on the estimated number of shipping containers.
c The total number of rinsate samples could vary depending on the total number of samples collected. The sample numbers are based on one rinsate per 20 samples per nondedicated sampling device.
d No extra volume is required for soil/sediment or product samples; for water samples, triple volume is required for organic analyses and double volume is required for inorganic analyses. Sample numbers are based on one MS/MSD per 20 samples per matrix.
e Total analyses and containers includes field and QA/QC aliquots to be submitted for fixed laboratory analysis.

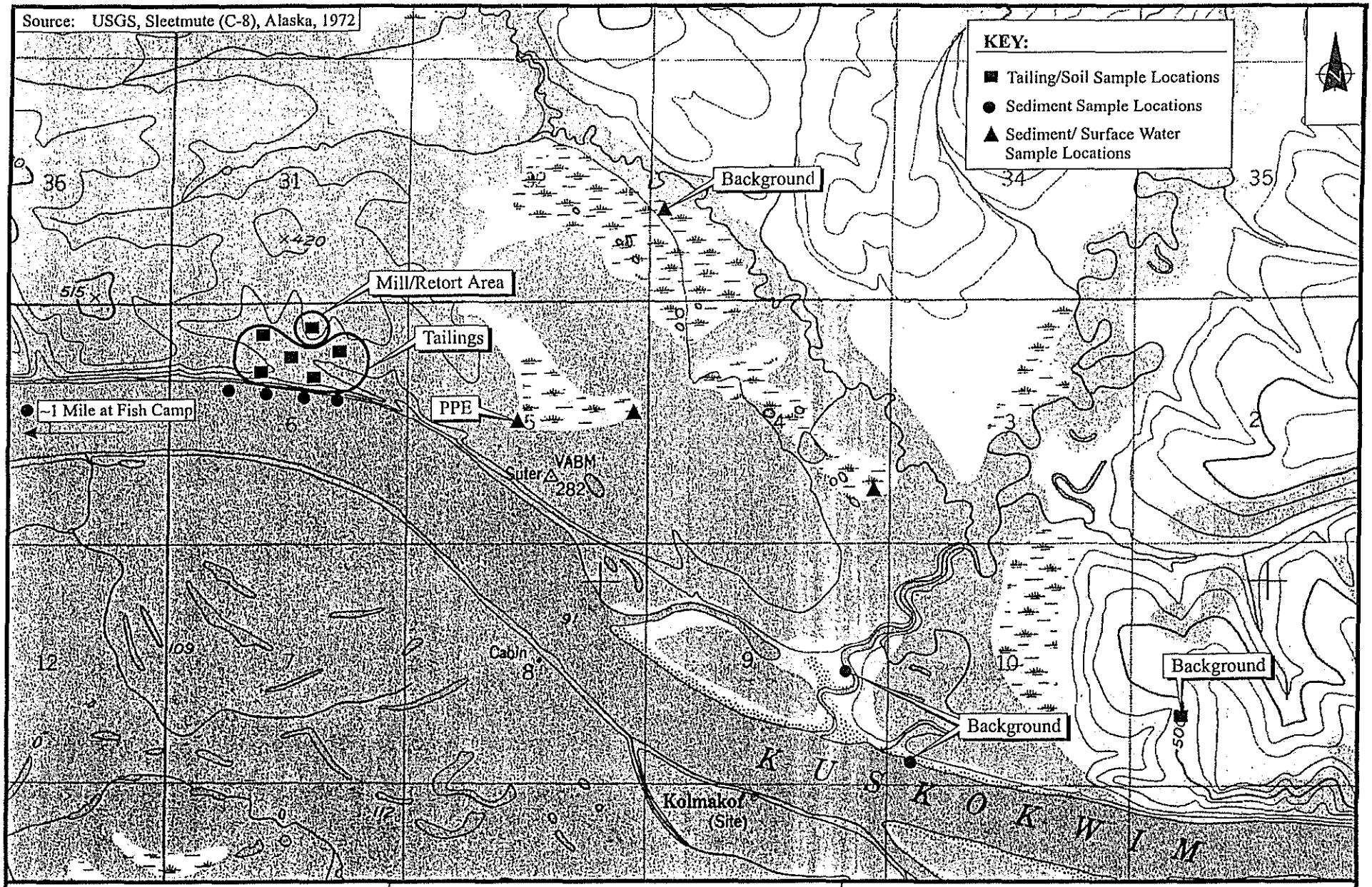
Key:

AA = Atomic absorption furnace technique.
CLP = Contract Laboratory Program.
CLPAS = Contract Laboratory Program Analytical Services.
CRDL = Contract-required detection limit.
EPA = United States Environmental Protection Agency.
GC and AFS = Gas chromatography separation and atomic fluorescent spectrometry.
ICP = Inductively coupled argon plasma.
MS/Dup = Matrix spike/duplicate.
MS/MSD = Matrix spike/matrix spike duplicate.
µg/kg = Micrograms per kilogram.
µg/L = Micrograms per liter.
N/A = Not applicable.
QA/QC = Quality assurance/quality control.
TAL = Target Analyte List.

Table 2-4

SAMPLE CODING
KOLMAKOF MINE INSPECTION
BETHEL, ALASKA

Digits	Descriptions	Code Example
1,2	Sample Location	01
3,4	Source Code	KM (Kolmakof Mine Site)
5,6	Sample Number	01
7,8	Matrix Code	SD (Sediment) SS (Soil) SW (Surface Water) SB (Subsurface Soil)



ecology and environment, inc. International Specialists in the Environment Anchorage, Alaska	KOLMAKOF MINE SITE Bethel, Alaska	Figure 2-1 SAMPLE LOCATION MAP			
	0 .5 1 Approximate Scale in Miles	Drawn: AES	Date 12/22/99	Job No. DE0201SIT0	Dwg.No. DE0201 2-1

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intentionally left blank.

3. ASSESSMENT/OVERSIGHT

3.1 ASSESSMENTS AND RESPONSE ACTIONS

The EPA QA officer or designee may conduct an audit of the field activities for this project. The auditor will have the authority to issue a stop-work order upon finding a significant condition that would adversely affect the quality and usability of the data. The EPA TM will have the responsibility for initiating and implementing response actions associated with findings identified during the site audit. Those actions likely would be taken by the project officer, contracting officer, and QA officer. Once the response actions are implemented, the EPA QA officer or designee may perform a follow-up audit to verify and document that the response actions were implemented effectively. In-house audits performed by the START may be conducted in accordance with the E & E (1996b) START QMP. No audits are planned for the Kolmakof Mine PA/SI.

3.2 REPORTS TO MANAGEMENT

The START PM will debrief the EPA TM daily. Laboratory deliverables will be as specified in the CLP Inorganic Statement of Work (ILM04.0) for CLP and/or Manchester Environmental Laboratory data and as specified in the laboratory subcontract bid specification package for commercial laboratory analyses. Once the project is complete and the resulting data are obtained, the START PM will assist in preparation of a final project report. The report will include a summary of the activities performed during the project and the resulting data (along with any statements concerning data quality). The report will be approved by the EPA TM before it is forwarded to the individuals identified in the SQAP distribution list located in the Table of Contents section of this SQAP.

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intentionally left blank.

4. DATA VALIDATION AND USABILITY

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

The data validation review of data packages will include an evaluation of the information provided on the analytical data sheets and required support documentation for all sample analyses; the supporting sample collection documentation, including COC; and field instrument calibration, results, and/or performance check documentation (if required by the method). The QA review also will examine adherence to the procedures as described in the cited SOPs and the requested analytical methods.

4.1.1 Data Reduction

Data reduction includes all processes that change the numerical value of the raw data. All fixed-laboratory data reduction will be performed in accordance with the appropriate methodology and will be presented as sample results.

4.1.2 Data Validation

Validation of CLP and/or Manchester Environmental Laboratory data generated under the Kolmakof Mine PA/SI will be performed by the EPA, Region 10, QA office or its designee. Data validation packages for CLP and/or Manchester Environmental Laboratory data must be completed within two weeks of receipt of analytical data from the laboratory to meet the schedule prescribed by the EPA.

Validation of data generated by a subcontracted laboratory will be performed by E & E within 2 weeks of receipt of analytical data from the subcontract laboratory. E & E will examine adherence to the QC criteria outlined in the specific analytical methods.

If requested by the EPA, E & E will evaluate all data for precision, accuracy, and completeness before submission of the Kolmakof Mine PA/SI Report to the EPA. Specific procedures for EPA, Region 10, QA office (or its designee) data validation to be used in this project are discussed in Section 4 of the QMP and are presented in the following EPA document:

- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994a).

The QC parameters of interest for the EPA inorganic methods that will be used on the Kolmakof Mine PA/SI samples are presented in this document. In particular, data validation will include reporting of bias for all estimated data (*J* or *UJ* flags) using the following bias qualifiers:

- B = Detected concentration is below the method reporting limit/contract-required detection limit but is above the instrument detection limit;
- H = High bias;
- K = Unknown bias;
- L = Low bias; and
- Q = Detected concentration is below the method reporting limit/contract-required quantitation limit but is above the method detection limit.

If requested by the EPA, the validation deliverable generated by the EPA, Region 10, QA office or its designee then will be reviewed by an E & E START chemist, focusing on the parameters listed in the EPA document cited above.

The information to be included in the Kolmakof Mine PA/SI Report will consist of a tabulation of analytical results and supporting QC information. Raw data will be available for inspection and maintained in the central job file.

4.1.3 Data Assessment Procedures

Following data validation and reporting, all project-generated and -compiled data and information will be reconciled with the objectives specified in Section 1.3 to assess the overall success of the Kolmakof Mine PA/SI activities. This data assessment, including points of achievement and any departure from project-specific objectives, will be discussed in the QA section of the Kolmakof Mine PA/SI Report.

4.2 VALIDATION AND VERIFICATION METHODS

The analytical QA requirements and data validation requirements will be as specified in Section 4.1.2 (EPA 1994a, 1994b).

The EPA TM will perform the final review and approval of the data. The EPA TM or QA officer will examine matrix spike/matrix spike duplicates, laboratory blanks, and laboratory duplicates to ensure that they are acceptable. The EPA TM and/or a designee also will compare the sample descriptions with the field records for consistency and will ensure that any anomalies in the data are documented appropriately.

4.2.1 Performance and System Audits

Performance and system audits will be conducted in accordance with the criteria described in Section 3 of the QMP. No audits are scheduled for the Kolmakof Mine PA/SI field activities.

4.2.2 Preventive Maintenance

All field instruments and equipment used for analysis will be serviced and maintained only by qualified personnel. All instruments will be maintained by senior staff and/or electronics technicians. All repairs, adjustments, and calibrations will be documented in an appropriate logbook or data sheet that will be kept on file. The instrument maintenance logbooks will clearly document the date, the description of the problems, the corrective action taken, the result, and who performed the work.

All equipment used by E & E in the field is subject to standard preventive maintenance schedules established by corporate equipment protocols. When in use, equipment will be inspected at least twice daily, once before startup in the morning and again at the end of the work shift before overnight storage or return to the charging rack. Regular maintenance, such as cleaning of lenses, replacement of in-line filters, and removal of accumulated dust, is to be conducted according to manufacturers' recommendations and in the field as needed, whichever is appropriate. All performed preventive maintenance will be entered in the individual equipment's logbook and in the site field logbook.

In addition to preventive maintenance procedures, daily calibration checks will be performed at least once daily before equipment use and recorded in the respective logbooks. Additional calibration checks will be performed as required. All logbooks will become part of either the permanent site file or the permanent equipment file.

4.2.3 Corrective Actions

The START corrective action program is addressed in Section 3 of the QMP. Corrective actions will be conducted in accordance with these QMP specifications.

4.2.4 Quality Assurance Reports

Data QA memoranda QA reports will be generated as part of the Kolmakof Mine PA/SI if the START is responsible for data validation. If the EPA, Region 10, QA office or its designee performs the data validation, then additional reports regarding data usability will be generated by the START.

4.3 RECONCILIATION WITH DATA QUALITY OBJECTIVES

Once the data results are compiled, the EPA TM and/or a designee will review the sample results to determine whether they fall within the acceptance limits as defined in this SQAP. Completeness also will be evaluated to determine whether the completeness goal for this project was met. If data quality indicators do not meet the project's requirements as outlined in this SQAP, the data may be discarded and resampling and reanalysis may occur. The TM will attempt to determine the cause of the failure (if possible) and make the decision to discard the data and resample. If the failure is linked to the analysis, calibration and maintenance techniques will be reassessed as determined by the appropriate laboratory personnel. If the failure is associated with the sample collection and resampling is required, the collection techniques will be re-evaluated as determined by the START PM.

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APPENDIX A

STANDARD OPERATING PROCEDURES

APPENDIX B

SUPPLEMENTAL FORMS

APPENDIX C

SAMPLE DOCUMENTATION AND CHAIN-OF-CUSTODY FORMS

APPENDIX D

COMMERCIAL LABORATORY STATEMENT OF WORK

Exhibit 1

SCOPE OF WORK

Mercury Speciation Laboratory Services
TDD 99-05-0001, PAN DE0101SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

EXHIBIT 1

1. GENERAL

Ecology and Environment, Inc., (E & E) with a business office located at 999 Third Avenue, Suite 1500, Seattle, Washington 98104, has entered into a contract (Contract No. 68-W6-0008) with the U.S. Environmental Protection Agency (EPA) to procure laboratory services for the analysis of methyl mercury speciation in soil and/or water samples.

A current task order requires the analysis of the water and soil samples collected on three separate events plus quality control samples, on a standard turnaround basis. E & E shall provide all necessary sample containers. Sampling activities are expected to begin on 9/27/99 and continue through 10/6/99. Samples will be shipped express overnight delivery or hand delivered to the laboratory. All sample analyses will require a 14-day turnaround period. The estimated number of samples, matrices, analytical methods, and quality assurance/quality control (QA/QC) requirements are summarized in Section 2.

Notwithstanding any other terms and conditions specified in this document, the laboratory will be responsible for non-reimbursed costs resulting from a violation (e.g., holding times) of the subcontract agreement including the QA/QC protocols specified in the methods and/or data rejected by the E & E QA division due to laboratory out-of-control analysis or QA/QC failure. The costs include but are not limited to the following: any costs, penalties, or loss of fee related to delayed performance by E & E of its contractual obligations pursuant to the Prime contract between E & E and DEQ; E & E re-sampling costs and/or project management costs; E & E subcontractor re-sampling costs and any other direct or indirect costs or damages suffered by E & E, including reasonable attorney fees, to remedy said QA/QC laboratory failure. Non-reimbursed costs will be assessed against any outstanding invoices. The laboratory will also be responsible for all re-analysis costs at its own facility (or in case of negligence or fraud at another facility) up to the total value paid to the laboratory under the work order.

2. ANALYTICAL REQUIREMENTS

Analytical methods to be performed are summarized in Table 2-1. The subcontracted laboratory shall perform all analyses in accordance with all method procedures. Also included in Table 2-1 are estimates of the number of samples and matrices. The number of samples does not include additional method-required quality control samples. The laboratory shall perform method-required QA/QC as indicated on Table 3-1.

TABLE 2-1
ANALYTICAL REQUIREMENTS

PAN No.	Estimated Quantity(1)	Matrix	Level	Analyte/Analytical Method
DE0101SIG0	25	Soil	definative	methyl mercury speciation GC/AFS
	9	Water	definative	methyl mercury speciation GC/AFS
DE0201SIG0	21	Soil	definative	methyl mercury speciation GC/AFS
	9	Water	definative	methyl mercury speciation GC/AFS
DE0601SIG0	24	Soil	definative	methyl mercury speciation GC/AFS
	13	Water	definative	methyl mercury speciation GC/AFS

(1) Estimated quantity includes does include method quality control samples.

3. QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Refer to Table 3-1 for QA/QC requirements. Inorganic requirements are discussed below.

INORGANIC ANALYSES

- Prior to sample analysis a minimum of a four-point initial calibration curve (three standards at varying concentrations which represent the linear range of the instrument and a blank) must be performed for AA analyses to demonstrate linearity on each instrument.

- A method blank analysis must be performed for each matrix in each sample batch.

- A sample duplicate, matrix spike sample, and a serial dilution sample (ICP analysis) must be analyzed for each matrix and level per sample batch or every 20 samples, whichever is more frequent.

- The following analytical sequence must be followed:

  1) Initial calibration
  2) Blank
  3) Ten samples
  4) Mid-range standard
  5) A blank
  6) Ten samples
  7) Repeat steps 4 through 6 until all samples are analyzed.

- Specific QA/QC protocol outlined in each analytical method must be followed.

Table 3-1

SUMMARY OF LABORATORY QUALITY ASSURANCE OBJECTIVES

Analytical Parameter	Technique Method(1)	Sample Matrix	Quantitation Limits(2)	Method Accuracy(3) (percent)	Method Precision (3) (percent)	Completeness (percent)
methyl mercury speciation	gas chromatograph/ atomic fluorescence spectrometry	soil	1μg/kg	to be determined	to be determined	90
methyl mercury speciation	gas chromatograph/ atomic fluorescence spectrometry	water	1μg/l	to be determined	to be determined	90

1 - Methods are contained in EPA "Test Methods for Evaluation Solid Wastes", SW-846, Revision 0, September 1986.

2 - Quantitation limits may be adjusted for sample dilution. Quantitation limits are typical attainable method quantitation limits. Actual laboratory reporting limits may differ from those listed.

3 - Specific laboratory established precision and accuracy limits for the method should be used.

4. DELIVERABLES

A final deliverable shall be provided to E & E within 15 days of the sample receipt. The final deliverable shall consist of the following at a minimum.

INORGANIC ANALYSES

- A statement of sample preparation and analytical methods used, and documentation of any deviation from the methods.
- A statement of instrument detection limits and/or quantitation limits.
- A statement of sample holding times (i.e., digestion and analysis dates).
- Analytical data sheets for all samples and blanks.
- Copies of instrument hard copy pertaining to samples, blanks, matrix spikes, duplicates, and calibration standards.
- A statement of weight, volumes, dilutions, instruments, etc. used in sample preparation and analysis.
- Data summary sheets for all QC analyses and initial and continuing calibrations, including calibration curves, percent relative standard deviations, percent difference values, blank analysis, duplicate sample results, spike sample results, etc.
- Analytical spike recoveries, where appropriate.
- Data summary sheets for other QC analyses performed which are specific to each analytical method.

In addition, all sample results, including QA/QC sample results, shall be provided to E & E in a database in any of the following formats: fixed-width ASCII, delimited ASCII, Microsoft Access, Borland dBase, Borland Paradox, Microsoft Excel, or Lotus 1-2-3. The following information should be provided in separate fields:

- E & E sample number;
- Laboratory sample number (if different than above);
- Sample medium;
- Analyte;

- Result;
- Qualifier;
- Detection or quantitation limit;
- Units;
- Analytical method; and
- Date analyzed.

BID RESPONSE FORM

FROM:

TO: Ecology and Environment, Inc.
999 Third Avenue, Suite 1500
Seattle, Washington 98104

Attention: Mary Ann Wright

RE: TDD 99-05-0001, PAN DE0101SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

Mercury Speciation Laboratory Services

Please complete this form and return to the above address even if you do not intend to bid on the enclosed solicitation package. Thank you very much for your help.

☐ Bid enclosed.

☐ No bid, because: _____

_____

_____

☐ Please maintain us on your bidder's mailing list.

_____
Signature

_____
Title

Exhibit 2
SUBCONTRACTOR'S PRICE SCHEDULE
FOR LABORATORY SERVICES
TDD 99-05-0001, PAN DE0l01SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

Bidder Name _____

Item	Analyte	Analytical Method	Matrix	Estimated Quantity(1)	Unit Cost	Total Price
TDD 99-05-0001, PAN DE0l01SIG0						
1	mercury speciation	GC/AFS	Soil	25	$____/each	$
2	mercury speciation	GC/AFS	Water	9	$____/each	$
					Total Price	
TDD 99-01-0002-A, PAN DE0201SIG0						
1	mercury speciation	GC/AFS	Soil	21	$____/each	$
2	mercury speciation	GC/AFS	Water	9	$____/each	$
					Total Price	
TDD 99-05-0006, PAN DE0601SIG0						
1	mercury speciation	GC/AFS	Soil	24	$____/each	$
2	mercury speciation	GC/AFS	Water	13	$____/each	$
					Total Price	
					TOTAL BID PRICE	$

(1) Estimated quantity includes field samples and quality assurance/quality control samples to be provided to the laboratory.

Total number of days to complete the work _____.

Acknowledgment of receipt of Clarification No(s). _____.

Acknowledgment of receipt of Modification No(s). _____.

_____
Signature

_____
Title

The following are referenced to the item numbers on the preceding Schedule of Fees and Services and are intended to further define the corresponding cost items identified therein.

Items 1 and 2 - Sample Analysis

This includes all laboratory costs and any labor necessary for analysis of samples as shown on the price schedule. This also includes any applicable taxes that will be charged for the services. Unit cost shall include sample containers that are required.

Invoices:

Required payment for the above items shall be submitted by the subcontractor on one invoice. Payment shall be made by E & E after receipt of all test results as indicated in Section 4 of Exhibit 1.

In order for auditors to verify invoices for payment, all invoices must be submitted in a manner which clearly identifies each line item on Exhibit 2. Invoices also must be submitted as specified in the Subcontract Agreement.

Exhibit 3

INSURANCE REQUIREMENTS

It is expressly understood and agreed that before work is actually commenced, Subcontractor and Sub-subcontractor, if any, unless expressly relieved of the insurance requirements specified below in writing by E & E shall subscribe for and maintain in full force and effect during the progress of the work, the following minimum insurance coverage:

A. Workmen's Compensation and Employer's Liability insurance coverage in amounts sufficient to satisfy state law.

B. Comprehensive General Liability insurance covering bodily injury in an amount of no less than $1,000,000 per occurrence.

C. Broad form property damage and liability insurance in an amount of not less than $1,000,000 per occurrence.

D. Comprehensive Automobile Liability insurance extending to owned and non-owned and hired automobiles in an amount of not less than $1,000,000 per occurrence.

E. Professional liability insurance in the amount of $1,000,000 per occurrence.

NOTE: These certificates, with the exception of Workmen's Compensation and Employer's Liability, shall specify Ecology and Environment, Inc., as additional insured and all shall require thirty (30) days prior notice of cancellation of coverage to E & E. Notice to E & E and E & E's written approval shall similarly be required where insurance coverages are decreased or other material change in coverage occurs.

Certificates shall be forwarded to:

Mary Ann Wright
Ecology and Environment, Inc.
999 Third Avenue, Suite 1500
Seattle, Washington 98104

EXHIBIT 4

ECOLOGY AND ENVIRONMENT, INC.
ADDITIONAL CLAUSES FOR
SUBCONTRACTED ANALYTICAL SERVICES

I. Payment

Chain of Custody forms will constitute the authorization of work for each sample group and will identify the billing numbers/project accounting numbers required for inclusion in each sample group invoice. Upon completion of the sample analyses and the delivery of the Exhibit 1 data requirements, the Subcontractor may submit an invoice for payment. Ecology and Environment, Inc. (E & E) reserves the right to withhold payment of 10% from each invoice. The withheld portion will be paid upon satisfactory completion of all requirements executed under this Subcontract by the subcontractor, including submission of a final invoice.

II. Disposal

Unless otherwise directed by E & E, the Subcontractor shall be responsible for disposition or ultimate disposal of any remaining sample materials in compliance with all applicable Federal, State, and Local laws and regulations. Also, upon E & E's request, the Subcontractor shall promptly provide at its own expense all pertinent information and records to document that such disposition or ultimate disposal has been performed in compliance with governing regulations.

III. Notification

The Subcontractor shall notify E & E immediately of any circumstances encountered which may impair the satisfactory performance of services in accordance with project specifications (including but not limited to holding time requirements, satisfactory QC spike recoveries and analysis of QA samples). Failure to notify E & E in a timely manner and to implement corrective actions as mutually agreed to may warrant contract termination.

IV. Delinquency/Damages

It is understood that upon failure by the Subcontractor to perform any element of this subcontract, as outlined in the scope of work, design, specifications, methods of analysis, documentation, and timely delivery of articles or services hereunder, E & E shall make an equitable adjustment to the amount due according to the following clauses A and B.

A. Data

Wherein, the Subcontractor fails to provide the analyses and reports, as required by the Terms and Conditions set forth in the contract contained herein, and/or the Subcontractor's data is rendered invalid, incomplete, or nonconclusive due to any failure or negligence on the part of the Subcontractor, including, but not limited to missing sample "Holding Times"; laboratory out-of-control analysis; or QA/QC failure, as determined by the E & E QA division, the Subcontractor shall reimburse E & E for any and all costs E & E incurs including but not limited to: costs, penalties, or loss of fee related to delayed performance by E & E of its contractual obligations pursuant to the Prime contract between E & E and its client; costs for providing new samples for analyses, or other efforts, including re-drilling, re-sampling and/or project management costs; E & E Subcontractor re-sampling costs; and any other direct or indirect costs or damages suffered by E & E, including reasonable attorney fees, and other costs, due to the Subcontractor's failure to provide said analyses/data as required by the contract

contained herein. The laboratory will also be responsible to all re-analysis costs. E & E reserves the right to determine to pay a reduced value for unusable data.

B. Late Deliverable

Penalties shall be assessed for every day late pertaining to Hard copies and Electronic copies. Time taken by E & E to check the deliverables will not count either as penalty time or against the original delivery schedule. E & E shall make an equitable adjustment to the amount due according to the following schedule.

1. Failure to meet non-standard delivery date shall result in forfeiture of all surcharge or premium price differentials.

2. Failure to meet standard delivery date shall result in a penalty, applied to the total order/subcontract cost, of 2% for each 24-hour period up to 10 calendar days, and 5% for each 24-hour period thereafter, up to a maximum of 75% total cost reduction. Further failure to meet the requirements of this order/subcontract shall constitute Breach of Contract.

V. Sample Quantity

The number of samples specified in this order/subcontract is an estimated quantity and is not a guarantee of sample quantity or requested analyses. The actual number of samples, their matrices, and the analysis performed may vary. E & E retains the right to cancel work under this order/subcontract at any time.

VI. Detection Limit

The laboratory will be responsible for determining and reporting the method detection limit according to 40 CFT 136, Appendix B, unless otherwise specified in Exhibit 1 - Scope of Work.

VII. Confidentiality

The Subcontractor shall strictly maintain the confidentiality of any and all project and/or business information including, but not limited to, E & E's policies and procedures, trade secrets, techniques, computer programs and software, project details, data, or recommendations (hereinafter "project information") they may obtain or utilize in the course of its contracted relationship with E & E and after the termination of that relationship, excepting all information and data in the public domain. Subcontractor shall permit access to project information by its own employees only on a strict "need to know" basis. Subcontractor and Sub-subcontractor, if any, shall permit access to project information to any other person, company, or governmental unit or agency only on a strict "need to know basis, and only with the prior consent of the E & E Project Manager (or contracting officer) that has authority over this Agreement. All disclosure of project information (including, but not limited to, verbal and/or written disclosure) to any person or governmental unit or agency other than an employee with "need to know" or a governmental unit or agency that has exercised its authority to compel disclosure shall be made only with prior written consent of the E & E Project Manager (or contracting officer) and that has authority over this Agreement.

Any violation of the provisions contained in this paragraph may result in immediate termination of Subcontractor's services by E & E, notwithstanding anything to the contrary contained in this paragraph. In the event such violations occur, E & E shall not be deemed to have waived any of its rights and shall have available to it all legal recourse and remedies to enjoin, seek damages, and sanctions against Subcontractor, Subcontractor's employees, Sub-subcontractor or any other person responsible for such violations.

SUBCONTRACTOR CERTIFICATION

Please complete the following as applicable.

Subcontractor Certification for Work Under Federal Government Contracts

The Subcontractor, _____, represents and certifies that it is as prescribed by
(Company Name)
applicable provisions of the Federal Acquisition Regulations a:

__ Small Business

__ Small Disadvantaged Business

__ Women Owned Small Business

__ Large Business

__ Other _____

_____
Certifying Officer of Corporation

_____
Title

_____
Date

Subcontractor Certification for Work Under Other Contracts

The Subcontractor, _____, represents and certifies that it is as prescribed by
(Company Name)
applicable provisions of the laws of the State of _____ a:
(State)

__ Minority Owned Business

__ Disadvantaged Business

__ Women Owned Business

__ Other _____

__ A copy of the certification is attached hereto (if applicable)

_____
Certifying Officer of Corporation

_____
Title

_____
Date

Notice: Any person who misrepresents a firm status as a business concern in order to obtain a contract or subcontract to be awarded under preference programs established by law may be subject to criminal or civil action and other penalty as may be proscribed by law.

Rev. 8/95
Boilerlegal-2600

SUB-SUBCONTRACTOR FORM

Mercury Speciation Laboratory Services
TDD 99-05-0001, PAN DE0l01SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

☐ _____ does not anticipate utilizing any sub-subcontractors in the performance of this scope of work.

_____
Signature

_____
Title

☐ _____ anticipates utilizing sub-subcontractor(s) in the performance of this scope of work. For each sub-subcontractor, please list below the name, address, services, and estimated dollar amount to be subcontracted.

_____
Signature

_____
Title

LIST OF PROSPECTIVE BIDDERS

Mountain Top, Kolmakof, and Cinnabar Mine Sites
Bethel, Alaska
Mercury Speciation Laboratory Services
TDD 99-05-0001, PAN DE0101SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

Bidder/Address	Date Bid Sent	Response Received
Columbia Analytical Services 1317 S 13th Avenue Kelso, WA 98626-2845 Mingta Lin 360/577-7222 360/636-1068 fax	8/31/99	
Frontier Geosciences 414 Pontius North Seattle, WA 98109 Sharon Goldblatt 206/622-6960 206/622-6870 fax	8/31/99	
Brooks Rand, Ltd. 3950 Sixth Avenue N.W. Seattle, WA 98107 Colin Davies 206/632-6206 206/632-6017 fax	8/31/99	

DATE: August 31, 1999

TO: Invited Sources

SUBJ: Invitation for Bid
TDD 99-05-0001, PAN DE0l01SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0
Mercury Speciation Laboratory Services

The enclosed Invitation for Bid constitutes a request from Ecology and Environment, Inc. (E & E) for laboratory analytical services which your company may be qualified to perform in the allotted time frame.

The solicitation package contains Exhibit 1 Scope of Work, Exhibit 2 Subcontractor's Price Schedule, Exhibit 3 Insurance Requirements, Exhibit 4 Clauses, and the other necessary forms for bid submittal. Upon award, a separate Purchase Order subcontract agreement will be issued for each of the TDDs listed above.

This solicitation is by invitation only. All invited responsible sources may submit a bid which will be considered by E & E.

The approximate start date of the work is the week of September 27, 1999.

A facsimile (fax) bid should be submitted to arrive in the Seattle office no later than 3:00 p.m., Thursday, September 9, 1999. The follow-up copy of the entire bid should be sent via express mail to arrive in the Seattle office no later than 3:00 p.m., Friday, September 10, 1999. The following notation should be placed in the lower left corner of the submittal envelope: START Mercury Speciation. Your bid should be addressed to:

Mary Ann Wright
Ecology and Environment, Inc.
999 Third Avenue, Suite 1500
Seattle, Washington 98104

Telephone: (206)624-9537
Fax: (206)621-9832

In order to be responsive, your bid must include the following:

- Completed and signed Schedule of Fees and Services (Exhibit 2).
- A signed Confirmation Statement (Exhibit 2).
- A copy of your standard current Certificate of Insurance. This certificate does not have to conform to all insurance requirements of the subcontract Exhibit 3, but by

submitting the bid, the bidder acknowledges the requirements and has priced the work to reflect the cost of correcting any deficiency between the requirements and the standard certificate submitted. A certificate of insurance meeting the requirements of Exhibit 3 must be submitted prior to commencing work under this agreement.

- A completed and signed "Subcontractor Certification" form.

- Completed and signed Sub-subcontractor form.

Evaluation of bids will be based on cost and the ability to provide the required services within the required time frame. In the event of any arithmetical errors, unit prices will govern. Any exceptions to which E & E has not agreed to in the form of a written addenda will constitute a non-responsive bid.

If you should decide not to submit an offer on this solicitation, please complete and return the enclosed Bid Response Form so that E & E will know whether or not to retain you on future bidder's mailing list.

If you have any further questions regarding the enclosed information, please call me at E & E's Seattle Office at (206)624-9537. Technical questions should be addressed to Mr. Paul Cooley in our Anchorage office. He can be reached at (907)257-5000.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

Mary Ann Wright, CACM
West Coast Subcontract Manager

Enclosure

cc: Paul Cooley, E & E, Anchorage

Exhibit 1

SCOPE OF WORK

Mercury Speciation Laboratory Services
TDD 99-05-0001, PAN DE0101SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

EXHIBIT 1

1. GENERAL

Ecology and Environment, Inc., (E & E) with a business office located at 999 Third Avenue, Suite 1500, Seattle, Washington 98104, has entered into a contract (Contract No. 68-W6-0008) with the U.S. Environmental Protection Agency (EPA) to procure laboratory services for the analysis of methyl mercury speciation in soil and/or water samples.

A current task order requires the analysis of the water and soil samples collected on three separate events plus quality control samples, on a standard turnaround basis. E & E shall provide all necessary sample containers. Sampling activities are expected to begin on 9/27/99 and continue through 10/6/99. Samples will be shipped express overnight delivery or hand delivered to the laboratory. All sample analyses will require a 14-day turnaround period. The estimated number of samples, matrices, analytical methods, and quality assurance/quality control (QA/QC) requirements are summarized in Section 2.

Notwithstanding any other terms and conditions specified in this document, the laboratory will be responsible for non-reimbursed costs resulting from a violation (e.g., holding times) of the subcontract agreement including the QA/QC protocols specified in the methods and/or data rejected by the E & E QA division due to laboratory out-of-control analysis or QA/QC failure. The costs include but are not limited to the following: any costs, penalties, or loss of fee related to delayed performance by E & E of its contractual obligations pursuant to the Prime contract between E & E and DEQ; E & E re-sampling costs and/or project management costs; E & E subcontractor re-sampling costs and any other direct or indirect costs or damages suffered by E & E, including reasonable attorney fees, to remedy said QA/QC laboratory failure. Non-reimbursed costs will be assessed against any outstanding invoices. The laboratory will also be responsible for all re-analysis costs at its own facility (or in case of negligence or fraud at another facility) up to the total value paid to the laboratory under the work order.

2. ANALYTICAL REQUIREMENTS

Analytical methods to be performed are summarized in Table 2-1. The subcontracted laboratory shall perform all analyses in accordance with all method procedures. Also included in Table 2-1 are estimates of the number of samples and matrices. The number of samples does not include additional method-required quality control samples. The laboratory shall perform method-required QA/QC as indicated on Table 3-1.

TABLE 2-1
ANALYTICAL REQUIREMENTS

PAN No.	Estimated Quantity(1)	Matrix	Level	Analyte/Analytical Method
DE0101SIG0	25	Soil	definative	methyl mercury speciation GC/AFS
	9	Water	definative	methyl mercury speciation GC/AFS
DE0201SIG0	21	Soil	definative	methyl mercury speciation GC/AFS
	9	Water	definative	methyl mercury speciation GC/AFS
DE0601SIG0	24	Soil	definative	methyl mercury speciation GC/AFS
	13	Water	definative	methyl mercury speciation GC/AFS

(1) Estimated quantity includes does include method quality control samples.

3. QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Refer to Table 3-1 for QA/QC requirements. Inorganic requirements are discussed below.

INORGANIC ANALYSES

- Prior to sample analysis a minimum of a four-point initial calibration curve (three standards at varying concentrations which represent the linear range of the instrument and a blank) must be performed for AA analyses to demonstrate linearity on each instrument.

- A method blank analysis must be performed for each matrix in each sample batch.

- A sample duplicate, matrix spike sample, and a serial dilution sample (ICP analysis) must be analyzed for each matrix and level per sample batch or every 20 samples, whichever is more frequent.

- The following analytical sequence must be followed:

  1) Initial calibration
  2) Blank
  3) Ten samples
  4) Mid-range standard
  5) A blank
  6) Ten samples
  7) Repeat steps 4 through 6 until all samples are analyzed.

- Specific QA/QC protocol outlined in each analytical method must be followed.

Table 3-1

SUMMARY OF LABORATORY QUALITY ASSURANCE OBJECTIVES

Analytical Parameter	Technique Method(1)	Sample Matrix	Quantitation Limits(2)	Method Accuracy(3) (percent)	Method Precision (3) (percent)	Completeness (percent)
methyl mercury speciation	gas chromatograph/ atomic fluorescence spectrometry	soil	1μg/kg	to be determined	to be determined	90
methyl mercury speciation	gas chromatograph/ atomic fluorescence spectrometry	water	1μg/l	to be determined	to be determined	90

1 - Methods are contained in EPA "Test Methods for Evaluation Solid Wastes", SW-846, Revision 0, September 1986.

2 - Quantitation limits may be adjusted for sample dilution. Quantitation limits are typical attainable method quantitation limits. Actual laboratory reporting limits may differ from those listed.

3 - Specific laboratory established precision and accuracy limits for the method should be used.

4. DELIVERABLES

A final deliverable shall be provided to E & E within 15 days of the sample receipt. The final deliverable shall consist of the following at a minimum.

INORGANIC ANALYSES

- A statement of sample preparation and analytical methods used, and documentation of any deviation from the methods.
- A statement of instrument detection limits and/or quantitation limits.
- A statement of sample holding times (i.e., digestion and analysis dates).
- Analytical data sheets for all samples and blanks.
- Copies of instrument hard copy pertaining to samples, blanks, matrix spikes, duplicates, and calibration standards.
- A statement of weight, volumes, dilutions, instruments, etc. used in sample preparation and analysis.
- Data summary sheets for all QC analyses and initial and continuing calibrations, including calibration curves, percent relative standard deviations, percent difference values, blank analysis, duplicate sample results, spike sample results, etc.
- Analytical spike recoveries, where appropriate.
- Data summary sheets for other QC analyses performed which are specific to each analytical method.

In addition, all sample results, including QA/QC sample results, shall be provided to E & E in a database in any of the following formats: fixed-width ASCII, delimited ASCII, Microsoft Access, Borland dBase, Borland Paradox, Microsoft Excel, or Lotus 1-2-3. The following information should be provided in separate fields:

- E & E sample number;
- Laboratory sample number (if different than above);
- Sample medium;
- Analyte;

- Result;
- Qualifier;
- Detection or quantitation limit;
- Units;
- Analytical method; and
- Date analyzed.

5. ADDITIONAL REQUIREMENTS

The samples and all sample extracts shall be stored in the dark at 4° Celsius by the laboratory. Any remaining sample amounts and extract solutions shall be retained by the laboratory under proper storage conditions (4° Celsius in the dark) for a period of three months after data submission. Organic extracts will be stored in vials/bottles with Teflon-lined septa at 4° Celsius (± 2° Celsius, in the dark) for three months after data submission. E & E retains the right to request these remaining sample amounts and extracts during this period. All sample glassware will be provided by E & E. The laboratory shall obtain verbal approval from the E & E QA division, followed by a written statement from the laboratory, prior to disposal of any samples or extracts. Disposal of samples and sample extracts must be in compliance with local, state, and federal regulations and will be the responsibility of the laboratory. Disposal cost is included in the price of analysis. Sample shipping containers shall be returned to the E & E Seattle office within two weeks of sample delivery with the price to be included as part of the cost of analysis.

All analytical results and technical communications will be directed to:

Paul Cooley, Ecology and Environment, Inc.
840 K Street, Suite 100, Anchorage, AK 99504

BID RESPONSE FORM

FROM:

TO: Ecology and Environment, Inc.
999 Third Avenue, Suite 1500
Seattle, Washington 98104

Attention: Mary Ann Wright

RE: TDD 99-05-0001, PAN DE0l01SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

Mercury Speciation Laboratory Services

Please complete this form and return to the above address even if you do not intend to bid on the enclosed solicitation package. Thank you very much for your help.

☐ Bid enclosed.

☐ No bid, because: _____

_____

_____

☐ Please maintain us on your bidder's mailing list.

_____
Signature

_____
Title

Exhibit 2
SUBCONTRACTOR'S PRICE SCHEDULE
FOR LABORATORY SERVICES
TDD 99-05-0001, PAN DE0l01SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

Bidder Name _____

Item	Analyte	Analytical Method	Matrix	Estimated Quantity(1)	Unit Cost	Total Price
TDD 99-05-0001, PAN DE0l01SIG0						
1	mercury speciation	GC/AFS	Soil	25	$_____/each	$
2	mercury speciation	GC/AFS	Water	9	$_____/each	$
					Total Price	
TDD 99-01-0002-A, PAN DE0201SIG0						
1	mercury speciation	GC/AFS	Soil	21	$_____/each	$
2	mercury speciation	GC/AFS	Water	9	$_____/each	$
					Total Price	
TDD 99-05-0006, PAN DE0601SIG0						
1	mercury speciation	GC/AFS	Soil	24	$_____/each	$
2	mercury speciation	GC/AFS	Water	13	$_____/each	$
					Total Price	
					TOTAL BID PRICE	$

(1) Estimated quantity includes field samples and quality assurance/quality control samples to be provided to the laboratory.

Total number of days to complete the work _____.

Acknowledgment of receipt of Clarification No(s). _____.

Acknowledgment of receipt of Modification No(s). _____.

_____
Signature

_____
Title

The following are referenced to the item numbers on the preceding Schedule of Fees and Services and are intended to further define the corresponding cost items identified therein.

Items 1 and 2 - Sample Analysis

This includes all laboratory costs and any labor necessary for analysis of samples as shown on the price schedule. This also includes any applicable taxes that will be charged for the services. Unit cost shall include sample containers that are required.

Invoices:

Required payment for the above items shall be submitted by the subcontractor on one invoice. Payment shall be made by E & E after receipt of all test results as indicated in Section 4 of Exhibit 1.

In order for auditors to verify invoices for payment, all invoices must be submitted in a manner which clearly identifies each line item on Exhibit 2. Invoices also must be submitted as specified in the Subcontract Agreement.

Exhibit 3

INSURANCE REQUIREMENTS

It is expressly understood and agreed that before work is actually commenced, Subcontractor and Sub-subcontractor, if any, unless expressly relieved of the insurance requirements specified below in writing by E & E shall subscribe for and maintain in full force and effect during the progress of the work, the following minimum insurance coverage:

A. Workmen's Compensation and Employer's Liability insurance coverage in amounts sufficient to satisfy state law.

B. Comprehensive General Liability insurance covering bodily injury in an amount of no less than $1,000,000 per occurrence.

C. Broad form property damage and liability insurance in an amount of not less than $1,000,000 per occurrence.

D. Comprehensive Automobile Liability insurance extending to owned and non-owned and hired automobiles in an amount of not less than $1,000,000 per occurrence.

E. Professional liability insurance in the amount of $1,000,000 per occurrence.

NOTE: These certificates, with the exception of Workmen's Compensation and Employer's Liability, shall specify Ecology and Environment, Inc., as additional insured and all shall require thirty (30) days prior notice of cancellation of coverage to E & E. Notice to E & E and E & E's written approval shall similarly be required where insurance coverages are decreased or other material change in coverage occurs.

Certificates shall be forwarded to:

Mary Ann Wright
Ecology and Environment, Inc.
999 Third Avenue, Suite 1500
Seattle, Washington 98104

EXHIBIT 4

ECOLOGY AND ENVIRONMENT, INC.
ADDITIONAL CLAUSES FOR
SUBCONTRACTED ANALYTICAL SERVICES

I. Payment

Chain of Custody forms will constitute the authorization of work for each sample group and will identify the billing numbers/project accounting numbers required for inclusion in each sample group invoice. Upon completion of the sample analyses and the delivery of the Exhibit 1 data requirements, the Subcontractor may submit an invoice for payment. Ecology and Environment, Inc. (E & E) reserves the right to withhold payment of 10% from each invoice. The withheld portion will be paid upon satisfactory completion of all requirements executed under this Subcontract by the subcontractor, including submission of a final invoice.

II. Disposal

Unless otherwise directed by E & E, the Subcontractor shall be responsible for disposition or ultimate disposal of any remaining sample materials in compliance with all applicable Federal, State, and Local laws and regulations. Also, upon E & E's request, the Subcontractor shall promptly provide at its own expense all pertinent information and records to document that such disposition or ultimate disposal has been performed in compliance with governing regulations.

III. Notification

The Subcontractor shall notify E & E immediately of any circumstances encountered which may impair the satisfactory performance of services in accordance with project specifications (including but not limited to holding time requirements, satisfactory QC spike recoveries and analysis of QA samples). Failure to notify E & E in a timely manner and to implement corrective actions as mutually agreed to may warrant contract termination.

IV. Delinquency/Damages

It is understood that upon failure by the Subcontractor to perform any element of this subcontract, as outlined in the scope of work, design, specifications, methods of analysis, documentation, and timely delivery of articles or services hereunder, E & E shall make an equitable adjustment to the amount due according to the following clauses A and B.

A. **Data**

Wherein, the Subcontractor fails to provide the analyses and reports, as required by the Terms and Conditions set forth in the contract contained herein, and/or the Subcontractor's data is rendered invalid, incomplete, or nonconclusive due to any failure or negligence on the part of the Subcontractor, including, but not limited to missing sample "Holding Times"; laboratory out-of-control analysis; or QA/QC failure, as determined by the E & E QA division, the Subcontractor shall reimburse E & E for any and all costs E & E incurs including but not limited to: costs, penalties, or loss of fee related to delayed performance by E & E of its contractual obligations pursuant to the Prime contract between E & E and its client; costs for providing new samples for analyses, or other efforts, including re-drilling, re-sampling and/or project management costs; E & E Subcontractor re-sampling costs; and any other direct or indirect costs or damages suffered by E & E, including reasonable attorney fees, and other costs, due to the Subcontractor's failure to provide said analyses/data as required by the contract

contained herein. The laboratory will also be responsible to all re-analysis costs. E & E reserves the right to determine to pay a reduced value for unusable data.

B. Late Deliverable

Penalties shall be assessed for every day late pertaining to Hard copies and Electronic copies. Time taken by E & E to check the deliverables will not count either as penalty time or against the original delivery schedule. E & E shall make an equitable adjustment to the amount due according to the following schedule.

1. Failure to meet non-standard delivery date shall result in forfeiture of all surcharge or premium price differentials.

2. Failure to meet standard delivery date shall result in a penalty, applied to the total order/subcontract cost, of 2% for each 24-hour period up to 10 calendar days, and 5% for each 24-hour period thereafter, up to a maximum of 75% total cost reduction. Further failure to meet the requirements of this order/subcontract shall constitute Breach of Contract.

V. Sample Quantity

The number of samples specified in this order/subcontract is an estimated quantity and is not a guarantee of sample quantity or requested analyses. The actual number of samples, their matrices, and the analysis performed may vary. E & E retains the right to cancel work under this order/subcontract at any time.

VI. Detection Limit

The laboratory will be responsible for determining and reporting the method detection limit according to 40 CFT 136, Appendix B, unless otherwise specified in Exhibit 1 - Scope of Work.

VII. Confidentiality

The Subcontractor shall strictly maintain the confidentiality of any and all project and/or business information including, but not limited to, E & E's policies and procedures, trade secrets, techniques, computer programs and software, project details, data, or recommendations (hereinafter "project information") they may obtain or utilize in the course of its contracted relationship with E & E and after the termination of that relationship, excepting all information and data in the public domain. Subcontractor shall permit access to project information by its own employees only on a strict "need to know" basis. Subcontractor and Sub-subcontractor, if any, shall permit access to project information to any other person, company, or governmental unit or agency only on a strict "need to know basis, and only with the prior consent of the E & E Project Manager (or contracting officer) that has authority over this Agreement. All disclosure of project information (including, but not limited to, verbal and/or written disclosure) to any person or governmental unit or agency other than an employee with "need to know" or a governmental unit or agency that has exercised its authority to compel disclosure shall be made only with prior written consent of the E & E Project Manager (or contracting officer) and that has authority over this Agreement.

Any violation of the provisions contained in this paragraph may result in immediate termination of Subcontractor's services by E & E, notwithstanding anything to the contrary contained in this paragraph. In the event such violations occur, E & E shall not be deemed to have waived any of its rights and shall have available to it all legal recourse and remedies to enjoin, seek damages, and sanctions against Subcontractor, Subcontractor's employees, Sub-subcontractor or any other person responsible for such violations.

SUBCONTRACTOR CERTIFICATION

Please complete the following as applicable.

Subcontractor Certification for Work Under Federal Government Contracts

The Subcontractor, _____, represents and certifies that it is as prescribed by
(Company Name)
applicable provisions of the Federal Acquisition Regulations a:

__ Small Business

__ Small Disadvantaged Business

__ Women Owned Small Business

__ Large Business

__ Other _____

_____
Certifying Officer of Corporation

_____
Title

_____
Date

Subcontractor Certification for Work Under Other Contracts

The Subcontractor, _____, represents and certifies that it is as prescribed by
(Company Name)
applicable provisions of the laws of the State of _____ a:
(State)

__ Minority Owned Business

__ Disadvantaged Business

__ Women Owned Business

__ Other _____

__ A copy of the certification is attached hereto (if applicable)

_____
Certifying Officer of Corporation

_____
Title

_____
Date

Notice: Any person who misrepresents a firm status as a business concern in order to obtain a contract or subcontract to be awarded under preference programs established by law may be subject to criminal or civil action and other penalty as may be proscribed by law.

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Boilerlegal-2600

SUB-SUBCONTRACTOR FORM

Mercury Speciation Laboratory Services
TDD 99-05-0001, PAN DE0101SIG0
TDD 99-01-0002-A, PAN DE0201SIG0
TDD 99-05-0006, PAN DE0601SIG0

☐ _____ does not anticipate utilizing any sub-subcontractors in the performance of this scope of work.

_____
Signature

_____
Title

☐ _____ anticipates utilizing sub-subcontractor(s) in the performance of this scope of work. For each sub-subcontractor, please list below the name, address, services, and estimated dollar amount to be subcontracted.

_____
Signature

_____
Title